AFIT/GEE/ENV/95D-15

PERCEPTIONS OF COHERENCE AND USABILITY IN ENVIRONMENTAL IMPACT DOCUMENTS AS FUNCTIONS OF VISUAL AND LINGUISTIC CUES

THESIS

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AFIT/GEE/ENV/95D-15

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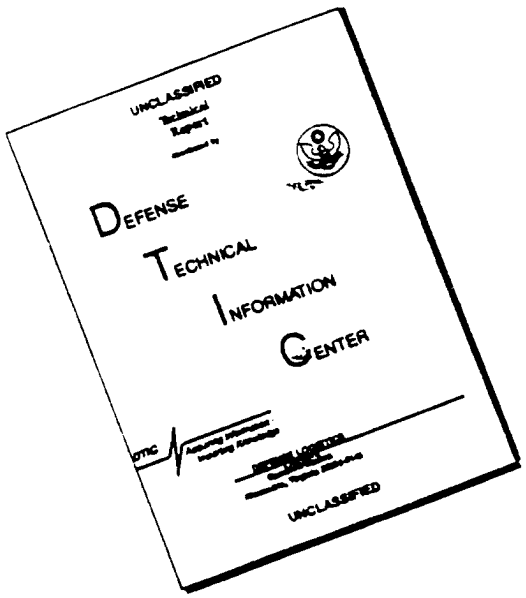

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THESIS

Presented to the Faculty of the School of Engineering

of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the Requirements for the Degree of

Master of Science in Environmental Engineering and Management

1st Lt Ronald B. Shankland, B.S.C.E.

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Presented to the Faculty of the Graduate School of Engineering

of the Air Force Institute of Technology

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Master of Science in Engineering and Environmental Management

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Ronald B. Shankland

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Glossary of Acronyms, Symbols, and Abbreviations

Item	Description
§	Part (for example, 40 CFR Part 1500 is written as 40 CFR §1500)
§§	Parts
α	Experimentwise error rate
AFB	Air Force Base
AFI	Air Force Instruction
AFIT	Air Force Institute of Technology
AFPD	Air Force Policy Directive
AFR	Air Force Regulation
ANOVA	Analysis of Variance
BAFB	Bergstrom Air Force Base
$C\alpha$	Coefficient Alpha
CEQ	Council for Environmental Quality
CFR	Code of Federal Regulations
COE	Corps of Engineers
COH	Coherence construct
DAF	Department of the Air Force
DoD	Department of Defense
DoDD	Department of Defense Directive
DoDI	Department of Defense Instruction
DRP	Delaware River Project
EA	Environmental Assessment
EE	Environmental Effects Section of an EIS
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EO	Executive Order
FCC	Federal Communications Commission
FONSI	Finding Of No Significant Impact
GED	General Education Development
GRP	Group
LING	Linguistic discourse elements
MAN	Manner construct
NEPA	National Environmental Policy Act

Item	Description
NOI	Notice of Intent
NOSY	No syntax cues are present
NOTS	No tense cues are present
NOTY	No typographical cues are present
NOWS	No white space cues are present
P&N	Purpose and Needs Section of an EIS
PL	Public Law
Prob	Probability
QLT	Quality construct
QTY	Quantity construct
QTYR	Reverse-scored quantity construct
REL	Relation construct
SAS	Statistical Analysis Software
SCRC	Spearman Coefficient of Rank Correlation
SEC	Section
Std Dev	Standard Deviation
Std.	Standardized
SUBJ	Subject
SY	Syntax
TS	Tense
TY	Typography
USA	United States Army
USAF	United States Air Force
USC	United States Code
USE	Usability construct
VER, Ver.	Version
VIS	Visual discourse elements
WS	White space

Abstract

Environmental impact statements and environmental assessments, which can be large, complex documents, are prepared so that decision makers can consider the environmental impacts of a proposed action prior to committing resources to that action. The National Environmental Policy Act of 1970 requires that these documents be clear, concise, and to the point so decision makers and the lay public can understand them. However, several authors claim these documents are not meeting this requirement.

In an effort to improve the usability of environmental documents, an AFIT GEEM student from last year, Jill A. Easterly, investigated visual and linguistic discourse elements in sample environmental documents by altering the consistency of these elements. A pool of readers answered short objective questions about passages they had read from sample environmental impact statements and Easterly measured how the presence or absence of cohesive discourse elements affected the subject's performance. The dependent variables were accuracy (number of correct responses) and efficiency (time it took the subject to answer the questions). Unfortunately, her results showed no statistical significance between or among the different treatments.

In addition to objective data, Easterly collected *subjective* data from the readers regarding their impressions and perceptions of the documents they reviewed. The purpose of this thesis was to explore this subjective data and determine if there was a statistically significant difference in the readers' perceptions of the document's usability.

Unfortunately, the results of this thesis paralleled those found by Easterly: there was no statistical significance between or among the different treatments. As in Easterly's study, these results could be attributable both to the design of the experiment and to the underlying theory of document usability itself. Valuable lessons were learned from this pilot study and further investigation in this area of document design may return results which more closely support the theory of document usability.

PERCEPTIONS OF COHERENCE AND USABILITY
IN ENVIRONMENTAL IMPACT DOCUMENTS
AS FUNCTIONS OF VISUAL AND LINGUISTIC CUES

I. Introduction

Research Objective

The objective of this research was to determine the extent to which the presence or absence of cohesive discourse elements in environmental documents affect user's perceptions of a document's usability. The environmental documents examined in this study were portions of Environmental Impact Statements (EISs); however, the findings were intended to be equally applicable to other large-scale environmental documents, such as Environmental Assessments (EAs).

The concept of document usability is founded, in part, on the linguistic theories of cohesion and coherence. In order to determine how the presence or absence of cohesive discourse elements affect document usability, this study posed two hypotheses relating cohesive discourse elements to coherence and usability. The first hypothesis investigates the concept of coherence:

Hypotheses

Hypothesis #1: Coherent documents are cohesive.

***Question**: Are coherence measurements, such as subjects' Likert scale responses to statements regarding coherence, relation, manner, quality, and quantity, related to the presence or absence of cohesive discourse elements, such as typography, white space, tense, and syntax?*

This hypothesis may be framed in terms of sub-questions which may be more directly analyzed through experimental investigation, such as:

a. *Are perceptions of coherence (comprehensibility or readability of a discourse)* ***related to*** *the presence or absence of cohesive discourse elements?*

b. *Are perceptions of relation (relevance or relatedness of information)* ***related to*** *the presence or absence of cohesive discourse elements?*

c. *Are perceptions of manner (clarity of information)* ***related to*** *the presence or absence of cohesive discourse elements?*

d. *Are perceptions of quality (truth or accuracy of the information)* ***related to*** *the presence or absence of cohesive discourse elements?*

e. *Are perceptions of quantity (amount of information)* ***related to*** *the presence or absence of cohesive discourse elements?*

f. *Are perceptions of coherence* ***correlated with*** *perceptions of relation, manner, quality, and quantity?*

The second hypothesis investigates the concept of usability:

Hypothesis #2: Usable documents are cohesive.

Question*: Are usability measurements, such as subjects' Likert scale responses to statements regarding usability, related to the presence or absence of cohesive discourse elements, such as typography, white space, tense, and syntax?*

Again, this hypothesis can be framed in terms of several sub-questions:

a. *Are perceptions of usability (ease of comprehending or withdrawing information from the discourse)* ***related to*** *the presence or absence of cohesive discourse elements?*

b. *Are perceptions of usability* ***correlated with*** *perceptions of coherence?*

To answer these sub-questions, and thereby address the hypotheses, an experiment was performed in which certain discourse elements in sample environmental documents were manipulated. Data was then collected on how readers responded to subjective statements about their perceptions of the document's usability. The following overview maps out how this thesis details these efforts.

Overview of the Remaining Chapters

This chapter, *Introduction*, establishes the objective of the research and proposes two hypotheses to be investigated. Chapter II, *Background*, examines the regulatory requirement for readable environmental impact documents and discusses the consequences of violating this directive. Chapter III, *Literature Review*, reviews prior research in the areas of coherence, cohesion, and document usability by discussing the Gestalt concept of continuity and Grice's Maxims for effective communication. Also, this chapter introduces the reader to the cohesive discourse elements which were altered in the experimental test instrument and

defines their meaning. Chapter IV, *Methodology*, describes the subjects of the experiment, explains how the experiment was designed, details the structure of the test instrument itself, and outlines the approach taken to analyze the data. Chapter V, *Results and Discussion*, reports the results of data analysis and discusses their apparent meaning. The final chapter, Chapter VI, *Conclusions and Recommendations*, interprets the results within the context of the hypotheses and makes recommendations for further studies.

II. Background

Legislation and Regulation

In an effort to depart from the "build it now and worry about [the environmental consequences] later" mentality, the U.S. Congress enacted the *National Environmental Policy Act* (NEPA) *of 1969* (Bregman and Mackenthun, 1992:1). Subsequently, President Nixon signed NEPA into law on 1 January 1970, ushering in a new 'environmental decade.' The federal mindset is captured in Title I of NEPA, *Declaration of National Environmental Policy*, which is a broad-based description of the government's approach to environmental responsibility. Title II of NEPA, *Council on Environmental Quality* (CEQ), created a three-member advisory board in the Executive Office of the President and assigned the CEQ responsibility for implementing NEPA. Executive Orders (EOs) 11514 and 11991 specifically directed the CEQ to draft the regulation accomplishing this objective. Accordingly, they created *CEQ Regulations for Implementing the Procedural Provisions of the NEPA*, hereafter referred to as the 'CEQ Regulations.'

As written, NEPA and the CEQ Regulations apply to *all* federal agencies, including the Department of Defense (DoD) (40 CFR §1500.1). In support of this legislation, the DoD followed suit by issuing DoD Directive (DoDD) 6050.1, *Environmental Effects in the United States of DoD Actions*, and DoDD 6050.7, *Environmental Effects Abroad of Major DoD Actions*. Shortly thereafter, the USAF published AFR 19-2, *Environmental Impact Analysis Process (EIAP)*, which was recently superseded by AFI 32-7061, *The Environmental Impact Analysis Process*. The DoD and USAF directives implemented all pertinent federal environmental laws, executive orders, and regulations. The environmental legislation is summarized in Table 1 on page 5.

With respect to proposed projects, the primary question posed by NEPA and supplementary legislation was, "What is the impact on the environment of the planned action and how can it be minimized?" (Bregman and Mackenthun, 1992:2). Attempts to answer this question are embodied in the environmental documents described in the following section.

Table 1

Chronology of Pertinent Environmental Impact Legislation (AFI 32-7061, 1995)

Date	Codification	Title
1 Jan 70	PL 91-190 42 USC §§4321-4347	*National Environmental Policy Act* (Amended 3 Jul 75 -- PL 94-52) (Amended 9 Aug 75 -- PL 94-83)
5 Mar 70	EO 11514	*Protection and Enhancement of Environmental Quality that Requires Federal Agencies to Implement NEPA* (Amended 24 May 77 -- EO 11991)
24 May 73	DoDD 5100.50	*Protection and Enhancement of Environmental Quality*
29 Nov 78	40 CFR §§1500-1508	*CEQ Regulations For Implementing The Procedural Provisions Of The National Environmental Policy Act* (Amended 1 Jul 86)
31 Mar 79	EO 12114 DoDD 6050.7	*Environmental Effects Abroad of Major DoD Actions*
30 Jul 79	DoDD 6050.1 32 CFR §188	*Environmental Effects in the United States of DoD Actions*
10 Aug 82	AFR 19-2	*Environmental Impact Analysis Process (EIAP)*
23 Feb 91	DoDI 5000.2	*Defense Acquisition Management Policies and Procedures* (Change 1 and USAF Supplement 1, 31 Aug 1993)
20 Jul 94	AFPD 32-70	*Environmental Quality*
24 Jan 95	AFI 32-7061	*The Environmental Impact Analysis Process* (Supersedes AFR 19-2)

Environmental Documents

Environmental documents include Notices of Intent (NOI), Environmental Impact Statements (EISs), Environmental Assessments (EAs), and Findings Of No Significant Impact (FONSIs) (40 CFR §1508.10). The purpose of an environmental document is to examine the possible consequences of a planned action, such as a construction project (Bregman and Mackenthun, 1992).

The NOI is simply a document describing an agency's intent to prepare and consider an EIS. It describes the proposed action, addresses scoping, and designates a point of contact for information regarding the proposed action and EIS (40 CFR §1508.22).

The most comprehensive of the environmental documents is the EIS. As stated in 40 CFR §1502.1:

> The primary purpose of an environmental impact statement is to serve as an action-forcing device to insure that the policies and goals defined in [NEPA] are infused into the ongoing programs and actions of the Federal Government. It shall provide full and fair discussion of significant environmental impacts and shall inform decisionmakers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment. Agencies shall focus on significant environmental issues and alternatives and shall reduce paperwork and the accumulation of extraneous background data. Statements shall be *concise, clear, and to the point*, and shall be supported by evidence that the agency has made the necessary environmental analyses. An environmental impact statement is more than a disclosure document. It shall be used by Federal officials in conjunction with other relevant material to plan actions and make decisions. [italics added]

An EIS can be extensive because it thoroughly examines the environmental consequences of a major proposed project and all reasonable alternatives, including the 'Do Nothing' alternative. Since the EIS is quite detailed, it may take up to a year just to prepare a draft EIS and it may reach several hundred pages in length, not including technical appendices.

If, however, it can be shown that environmental impact is minimal, an EA may be prepared in lieu of a full-fledged EIS. 40 CFR §1501.3 and §1508.9 describe the EA as a "concise public document . . . that serves to briefly provide sufficient evidence and analysis for determining whether to prepare an [EIS] or a [FONSI]." Being less detailed than an EIS, an EA may be completed in significantly less time.

Finally, the FONSI, which may be prepared after an EA has been performed, merely states that an action "will not have significant effect on the human environment and . . . an environmental impact statement therefore will not be prepared" (40 CFR §1508.13).

This research focused primarily on the EIS and EA because they are the most detailed, comprehensive, and lengthy environmental documents. EAs were included because they can be nearly as complex and lengthy as EISs. As Jain points out, the EA's format ". . . is similar to that of an EIS. . . . In the long run, it is desirable to use the same general format for an EA as is used for an EIS" (Jain and others, 1993: 63). Blaug (1993) supports this idea by pointing out that of 33 federal agencies preparing EISs in the preceding year, six of those agencies (18%) had prepared EAs *first*. Of those six agencies, five of them *always* prepare EAs before writing EISs.

Definition of Readability/Usability

Regarding environmental documents themselves, one of the most important issues addressed by the CEQ Regulation is that of *readability*. Readability has been defined in a variety of ways. According to Miller and Kintsch (1980) as quoted by Baker and others (1988: 59), readability is "an interaction between the

text and the reader's prose processing capabilities, rather than some innate property of the text." Conversely, Horning (1993) defines it as "countable, objective features of text per se." Objective measurement of readability features has been hotly debated for many years (Hanna, 1994) and its validity, discounting subjective features such as 'interestingness' and 'background knowledge', is suspect (Anderson and Davison, 1988). More simply, Klare (1963), as quoted in Gallagher and Patrick-Riley (1989: 85), defines readability as "the level of difficulty of written text . . . usually referenced at a grade school level."

The purpose of the readability requirement imposed by the CEQ Regulation is to make environmental documents usable for decision makers and lay persons; thus, a more comprehensive definition of document *usability*, such as that provided by Guillemette as quoted by Campbell (1995: 85), may be suitable:

> The term usability refers to the degree to which documentation . . . can be effectively used by target readers in the performance of tasks under environmental requirements and constraints. Effectiveness is defined in terms of reader performance with written materials and acceptability of those materials to the reader. Basic human performance dimensions include efficiency (speed) and bias(accuracy) in performing tasks. Readers themselves are the primary source for reporting perceptions of tiredness, discomfort, boredom, frustration, or excessive personal effort in using documentation. (Guillemette, 1989: 218)

For this research, the working definition of 'usability' was assumed to be the quality of a document which enables a layperson to read and understand the information contained within that document. Due to the lack of universal definition for 'readability', the term was considered to be synonymous with 'usability'.

The section of the CEQ Regulation (CEQ, 1978) which comments specifically on the readability of EISs applies equally well to other environmental documents:

> *§1502.8 Writing*
>
> Environmental impact statements shall be written in plain language and may use appropriate graphics so that decision makers and the public can readily understand them. Agencies should employ writers of clear prose or editors to write, review, or edit statements, which will be based upon the analysis and supporting data from the natural and social sciences and the environmental design arts.

Despite this regulation's requirement for clear, concise, and readable environmental documents, prior research has shown that many environmental documents are generally incomprehensible to the lay public (Gallagher and Patrick-Riley, 1989; Weiss, 1989; Axline and Bonine, 1990; Alciere, 1993; Gallagher and Jacobson, 1993; Easterly, 1994). Although the chapter entitled "Preparing and Processing Environmental Documents" in AFI 32-7061 discusses the preparation of environmental documents, it does not specifically address the readability aspects of the documents. Incorporation of 40 CFR §§1502.7-1502.8 into the

AFI is made simply by blanket adoption of the CEQ Regulation; therefore, the AFI does not notably address formatting elements which may affect the readability of the documents.

Several different formatting elements are employed in document design, also referred to as 'page layout'. These formatting elements include typographical emphasis, line spacing, indentation, color, and type size. They are important because they serve as 'guideposts', helping steer the reader through the document, thus making it more readable (Weiss, 1989). A lack of proper formatting ". . . discourages readers. Some are dissuaded not to read the document at all, and those that are not dissuaded become fatigued, leading to low comprehension" (Gallagher and Jacobson, 1993: 99). Because AFI 32-7061 does not explicitly direct *how* the documents should be formatted, it does not help the USAF produce *better, more readable* EISs.

Consequences

The importance of readability was aptly summarized in the introduction to the article entitled *An Unreadable EIS is an Environmental Hazard:*

> Many EISs, of course, are written by engineers and researchers, without benefit of professional "wordsmiths." The engineer's notorious aversion to writing (and the unwillingness of most firms to buy writing services) means that EISs are at least as unreadable as most other technical documents prepared by a team of middling writers working to an unforgiving deadline.
>
> But, despite what some consultants may think, the bad writing in an EIS is much more serious than a matter of aesthetics; the issue is not "English" or refinements of style. The issue is the quality of the document, its usefulness in support of the goals of environmental legislation, and, by implication, the quality of the environmental stewardship entrusted to the scientific community. (Weiss, 1989: 236)

The consequences of an unreadable document are very real. For example, "[a] federal court issued a year-long injunction against the entire federal chemical spray control program to control gypsy moths because the EIS was too dense and technical to be read and understood" (Axline and Bonine, 1990; 61). Time is not the only factor; money and manpower costs are also involved. Axline and Bonine (1990) provide another good example in which the Federal Communications Commission (FCC) had to designate five full-time staff members just to answer the public's questions about a poorly written regulation. Since public or governmental opposition to a planned action can drain scarce resources such as time, money, and manpower, it becomes imperative that Air Force writers make environmental documents as readable as possible. In order to do this, writers will employ cohesive discourse elements in their documents. These elements are described in the following chapter.

III. Literature Review

Prior Research

The unintelligibility of environmental documents has been attributed to many different factors. Weiss (1989) focused on three types of errors, strategic, structural, and tactical, committed during the document's design. These errors are described in Table 2.

Table 2

Types of Errors Which Detract From Readability (Weiss, 1989)

Strategic Errors	Mistakes of **planning;** failure to understand *why* the environmental document is being written and *for whom.* Example: In one part of an EIS written for a proposed dam, the hydrogeological aspects of the underlying soil and rock strata are addressed in great technical detail. In another part of the same EIS, the botanical and zoological diversity of species is discussed; again in great detail. No connection is made between the two parts. Interpretation: The EIS, which was probably written by a team of scientists and engineers, is unintelligible to all but the most well-educated layperson. Even worse, the reader who happens to struggle through the technical detail doesn't sense the *purpose* of the document. It is simply a collection of facts *about* a subject.
Structural Errors	Mistakes of **organization;** failure to arrange the elements of the document in a way that makes them *easy to follow.* Example: A citizen reviews an EIS hoping to determine the proposed project's most important effect on the site's groundwater. There is a lack of typographical emphasis (bolding, italics, underlining) to help the reader find the information. Interpretation: Without typographic 'signposts' to point the way, the reader cannot distinguish the most "pointed and conclusive [statements] from the dense background of the page."
Tactical Errors	Mistakes of **editing;** failure to test and revise the text for *clarity* and *readability.* Example: In her article, Alciere (1993; 263) provides a good example: "The menu software is utilized to develop, organize, and display the menuing techniques used within this system. Regular menu-item nomenclature appears (OPERATIONAL) in upper case print. A menu item in lower-case indicates that the user will have access to the item, but the item is presently not active at this time." Interpretation: This passage, which was extracted from a computer user's manual, is practically indecipherable because it is a clumsy, awkward, and wordy construction or, to use Alciere's term, "Governmentspeak."

Weiss proposes that solutions to these errors are attainable. To eliminate strategic errors, a director with 'intellectual vigor' can provide the leadership required to manage the project and coordinate the assessment team. Structural errors can be eliminated by employing professional document design principles to

unify graphic elements and associated text. Finally, tactical errors can be eliminated or controlled through the efforts of a professional editor (Weiss, 1989: 240).

In a similar discussion of document readability, Gallagher and Patrick-Riley (1989) evaluated federal land management plans using the Flesch Reading Ease Scale. This scale uses two objective measures (number of words per sentence and number of syllables per word) to assign a 'reading level' to a text passage. This method of measuring readability is refuted by Anderson and Davison (1988) as inappropriate. They purport that 'interestingness' and depth of the reader's background knowledge are more significant contributors to readability:

> In most research on readability to date, very high correlations are reported between the predictions of formulas based on text features such as word complexity and sentence length and measures of comprehension associated with reading ability. We suggest that these high correlations are the by-product of using an inappropriate statistical model which aggregates texts and readers, and gives an exaggerated impression of the contribution of linguistic factors in the text to ease or difficulty of comprehension.
>
> . . . . . .
>
> Readers without adequate background knowledge for a text find it much harder to read and understand than readers who have the right background knowledge. A text whose content and way of presenting information are boring to the reader is less well understood than a text which falls within a particular reader's interests.
>
> . . . . . .
>
> [I]t is not surprising that there are many factors about readers and texts which cannot be described in terms of a readability formula. (Anderson and Davison, 1988: 48-49)

Gallagher and Patrick-Riley conclude by providing two recommendations. First, the CEQ and Congress should more clearly define (a) the purpose of the environmental document, (b) who the target audience is, and (c) the meaning of the term 'plain language'. Second, ". . . each agency should establish a defensible writing program that describes the intended audience, the readability standards, and methods for achieving those standards" (Gallagher and Patrick-Riley, 1989). Referring to Weiss's list of document readability errors, it is evident that Gallagher and Patrick-Riley concentrated on *strategic* and *tactical* errors.

Axline and Bonine decry the unreadability of environmental documents by focusing on the use of unintelligible 'legalese' and indecipherable technical jargon, which are symptoms of *tactical* writing errors. They concur with Gallagher and Patrick-Riley in their recommendation to the CEQ:

> NEPA's informational purposes cannot be met by documents that contain necessary substantive information but bury that information in overlong documents filled with dense and technical verbiage. . . . [W]e urge the CEQ to strengthen its regulations by promulgating enforceable standards governing the readability of NEPA documents. (Axline and Bonine , 1990: 75)

In her article *Avoiding Governmentspeak*, Alciere (1993) supports Axline and Bonine in their criticism of nonsensical language and structure in documents. She primarily focuses on government writing, but since most EISs and EAs are written by and for government agencies, her observations are eminently pertinent to this research. She provides recommendations which fall into three broad categories: document organization (structural errors), document length (strategic errors), and writing style (tactical errors). In each of these categories, she provides general advice on how to improve the document; however, she does not explicitly address the topics of cohesion or coherence. The only advice she provides with respect to structural errors is to "distinguish their outline from your own", "downplay numbered headings", and "shorten the table of contents" (1993: 262). These recommendations fall short by failing to address specific principles of cohesion theory, such as the importance of consistency in document development. For example, using inconsistent typographic formats for heading levels while reducing the length of the table of contents will not correct structural errors. Consistency is addressed by cohesion theory in the following section, entitled *Coherence and Cohesion*.

Focusing on the typography of EISs, Gallagher and Jacobson evaluated the readability of 150 EISs which had an average length of 164 pages. They observed that "[a]t present there is no comprehensive set of criteria specifically for EISs or similar large government publications" (1993: 39). Accordingly, they found ". . . a wide range of quality in the typography of EISs" (1993: 46). They emphasize that poor typographic quality, combined with poorly written prose, can make an environmental document unreadable to an average reader.

Although guidance on how to write readable documents abounds, some readers feel that writers *deliberately* fail to use it because they *do not want* information in the documents to be easily found, questioned, or debated (Weiss, 1989: 236).

None of the studies described in preceding paragraphs couched their investigations or findings in terms of cohesion theory. In an effort to remedy this shortcoming, Easterly (1994) investigated the impact of applying specific principles of cohesion theory and document design to selected sections of sample EISs. In her experiment, a pool of readers answered short objective questions about passages they had read from sample environmental impact statements. She measured how the presence or absence of cohesive discourse elements affected the subject's performance. The dependent variables were accuracy (number of correct responses to questions testing comprehension of the EIS) and efficiency (time it took the subject to answer the questions). Unfortunately, her results showed no statistical significance between or among the different treatments.

This research, like Easterly's, will focus on the second type of error identified by Weiss in Table 2 -- structural error. Where Easterly investigated how the presence or absence of cohesive elements affected the reader's *objective* performance on simple, measurable tasks, this research will explore the reader's *perception* of a document's usability using the subjective data Easterly collected during the course of her experiment. Before this can be done, however, several topics in cohesion theory and document design must be examined.

Coherence and Cohesion

Essential to the readability of a document are the concepts of *coherence* and *cohesion*. Campbell (1995) investigated these principles and defined several terms. A *coherent* document ". . . is one in which [the reader] perceives continuity, as well as adequacy, accuracy, and clarity." Coherence is the global or holistic perception of continuity, adequacy, accuracy, and clarity, and is always related to the meaning of the discourse. For example, a reader's perception that an EIS is incoherent means that the reader cannot understand the meaning of the EIS.

Similarly, but not identically, a cohesive document is one in which a writer ". . . has established continuity through the use of similar and proximate discourse elements." Cohesion can be either a global or a local perception and may or may not be directly related to meaning. Similar synonyms, such as 'roads' and 'highways', in consecutive sentences are cohesive and related to meaning, while similar typeface (e.g., italic boldface) in consecutive headings is cohesive but clearly not related to meaning.

Discourse elements are defined as "any of the full range of components that appear in [oral or written] communication" and are divided into two categories: linguistic and non-linguistic. Non-linguistic discourse elements are further separated into two subcategories: auditory and visual. Table 3 illustrates the definition of discourse elements and provides simple examples.

Table 3

[Partial] List of Elements That May Be Involved in Creation of Discourse Unity, Along With Representative Examples of Each Type (Campbell, 1995; 13)

NONLINGUISTIC

VISUAL	example	AUDITORY	example
Typography	italic print	**Pitch**	deep tone
Geometric Shape	rectangular bar in graph	**Rhythm**	staccato
Picture/ Drawing	photograph		
Color	blue background		
Grapheme	β (Greek "beta")		
Body Gesture	"ok" hand sign		

LINGUISTIC

PHONOLOGICAL	example	MORPHO/ SYNTACTIC	example	SEMANTIC	example
Initial Segment	/b/ in "box"	**Voice**	money "was stolen" (passive)	**Synonymy**	"cat" & "feline"
Coda	/ox/ in "box"	**Tense/Aspect**	money "has disappeared" (past perfect)	**Overlap**	"cat" & "kitten"
Stress	/el/ in "boxelder"	**Gender/Number**	"she" quit (feminine, singular)	**Hyponymy**	"cat" & "animal"
		Phrase/Clause Structure	"in the garden" (prepositional phrase)	**Antonymy**	"animal", "mineral", & "vegetable"

Cohesion is what makes a document "easy to follow" (Weiss, 1989; 236), thus reducing structural error and promoting coherence. The primary difference between coherence and cohesion is the manner in which 'continuity' is expressed. Since coherence is dependent solely upon the reader's *perception*, it is difficult to describe coherence and even more difficult to assure it. Good writers go to great lengths to make their documents as coherent as possible, but they can never be certain that the exact message they are trying to convey will reach the reader intact. If all the elements requisite for unity are present *and* the reader perceives the same message sent by the writer, then the document is considered coherent.

The Amelia Bedelia series of children's books make light of misperceived messages and serve as good examples of how discourse, seemingly coherent and unambiguous to the reader, can be innocently misinterpreted by a receiver. In the book *Merry Christmas, Amelia Bedelia*, Amelia is a housekeeper working in the Rogers' home before Christmas. Mrs. Rogers asks Amelia to make some popcorn for popcorn balls . . .

> "How much should I pop?" said Amelia Bedelia.
>
> "I'll need six cups," said Mrs. Rogers.

> Amelia Bedelia went to the kitchen . . . [and] . . . measured six cups of corn. Then she popped and she popped and she popped.
>
> "Mrs. Rogers must love popcorn balls," said Amelia Bedelia
>
> . . . . . .
>
> [Mrs. Rogers comes into the kitchen and sees seven huge pots, pans, and bowls brimming over with mounds of popcorn. Amelia Bedelia looks proud of herself, but Mrs. Rogers looks flabbergasted.]
>
> "Amelia Bedelia!" she said. "Why did you pop so much corn? I only need six cups."
>
> "And I popped six cups," said Amelia Bedelia.
>
> "I meant six cups of popped corn," said Mrs. Rogers.
>
> "Then you should have said so," said Amelia Bedelia. (Parish, 1986; 8-21)

The discourse between Mrs. Rogers and Amelia Bedelia seemed simple enough, but the literal-minded housekeeper did not perceive the same message that Mrs. Rogers thought she had sent. The message lacked coherence simply because the receiver, Amelia Bedelia, didn't perceive the message as it was intended by the sender.

Like coherence, cohesion is a psychological entity; however, cohesion is more easily identified than coherence because it's *cues* are manifested 'physically' within the document itself. For example, a reader can *see* that similar heading levels have similar appearance and that the space between paragraphs is greater than the space between lines *within* a paragraph. However, not all cohesive cues are purely physical. For example, although a cohesive series of noun phrases may all begin with gerunds as cues ("managing", "reviewing", "budgeting", etc.), gerunds are not 'physical' things; they are a cognitive entity and exist in the mind of the reader. Still, the reader can sense these cohesive cues and recognize order and structure in the discourse.

While coherence is related to meaning, cohesion is related to form and structure. An interesting point of illustration is the fact that a reader can detect cohesion between discourse elements without being required to understand content of a discourse at all. As Easterly explained, "a 10-year-old might find an EIS unclear (hence incoherent) despite the fact that the EIS writer has placed certain cohesive elements in the document" (1994: 18). By way of illustration, books about desktop publishing often use "Greek text", a random combination of letters that have no meaning, to show basic layout and spacing (Groff, 1990). An example is shown in Figure 1:

Figure 1. Example of "Greek Text" Used for Cohesive Structuring (Groff, 1990)

Although most of the text used in this fictitious sales advertisement is unintelligible gobbledygook, it still demonstrates a recognizable structure. It is apparent that several different items are on sale, they are probably similar in function, and there is a short description of the item below its main heading. The advertisement appears cohesive, even though the details, such as the merchandise descriptions and prices, are almost entirely incoherent.

Gestalt Continuity

In Chapter 2 of her book, Campbell (1995) explains her view of coherence from the recipient's perspective. She brings together the concept of continuity, as defined by the Gestalt school of psychology, and the concept of coherence, as investigated by H. Paul Grice in his work on discourse unity.

The Gestalt school of psychology emerged from a group of European psychologists including Kurt Koffka, Wolfgang Kohler, and Max Wertheimer, who opposed the narrow, 'atomistic', view of psychology estab-

lished by the 19th century 'father of psychology', Wilhelm Wundt (Elkind, 1994). The members of the new school contended that:

> [T]he atomistic approach [to psychology] could never lead to the understanding of major psychological phenomena. A symphony, they argued, is more than the sum of its individual notes. The form (Gestalt) of anything has qualities that are different from, and that cannot be attributed to, the sum of its parts.
>
> To support their argument, the Gestalt psychologists focused on perception. They demonstrated that perception is organized into holistic rather than atomistic components. Perception is organized into the figure, such as a soloist playing a concerto, and the ground, the orchestral accompaniment. Visually too the perception of the observer is centered on the soloist and the conductor, who are the figures, and the orchestra, which is the ground. (Elkind, 1994)

Campbell (1995) explains cohesion theory in terms of the Gestalt concept of continuity. This theory accounts for the human mind's natural tendency to group things that are similar and proximate (see Wertheimer, 1938; Easterly, 1994; and Campbell, 1995, for more detailed descriptions).

Grice's Maxims

H. Paul Grice categorized four discourse factors (*relation, quantity, manner, quality*) to describe what recipients assume about coherent discourse and explain why discourse can be perceived as coherent despite a lack of explicit or logical connections between participants' contributions. Provided that discourse participants are *cooperating* (actually trying to communicate with each other), recipients can make sense of less-than-adequate contributions through *implicature*. Implicatures (unstated and not logically necessary meanings) are created by the recipient in order to build a bridge that connects seemingly unconnected contributions.

Grice established maxims for each discourse factor which, if *flouted* (intentionally or accidentally violated), would require the recipient to manufacture an implicature in order to derive meaning from the discourse. The following descriptions are taken from Campbell (1995) and Parker and Riley (1994):

Maxim of Relation

Each participant's contribution should be relevant to the subject of discourse. A contribution may appear to be irrelevant to earlier contributions if this maxim is flouted. For example, if a student asks, "Is professor Smith in her office?" and the secretary replies, "Her car isn't in the parking lot", then the secretary has flouted the Maxim of Relation. Because the student assumes the secretary is being cooperative (not deliberately saying something irrelevant), the only way the student can make sense of the secretary's contribution is to assume that the seemingly irrelevant (i.e., the location of the professor's car) is actually

relevant (i.e., the professor drives a car to work but her car is not here; therefore, the professor must not be here). Although the secretary hasn't directly said so, the student creates the implicature that the professor is not in her office.

Maxim of Quantity

Each participant's contribution should be just as informative as required. Otherwise, a contribution may appear to offer too little or too much information. For example, if a wife asks her husband, "Where are you going?" and he answers, "Out", then the husband has flouted the Maxim of Quantity. Although he hasn't directly said so, the wife may create the implicature that the husband is angry and doesn't want to answer any more questions.

Maxim of Manner

Each participant's contribution should be expressed in a reasonably clear fashion; otherwise it may appear to be too obscure or indirect. For example, if a principal asks one of her first grade teachers, in the presence of the students, "Is anything special happening in your classroom this afternoon?" and the teacher responds, "Es-yay, anta-say aus-clay is-way oming-cay oo-tay ass-clay", then the teacher has flouted the Maxim of Manner. Since the teacher used Pig Latin ("Yes, Santa Claus is coming to class."), which he assumes the children don't understand, the principal may create the implicature that the teacher does not want the her to tell the children about the surprise.

Maxim of Quality

Each participant's contribution should be truthful and based on sufficient evidence; otherwise, it may appear inaccurate. For example, if a student asks his thesis advisor, "Do I have a shot at the thesis award?" and she replies, "Sure-- when pigs fly", then she is flouting the Maxim of Quality. The student would create the implicature that she thinks the probability of his winning the thesis award is less than infinitesimal.

The lack of cohesive discourse elements in an environmental document can violate Grice's Maxims and prompt readers to create implicatures the writer may not have intended. Recall Weiss's statement that some readers feel writers *deliberately* make environmental documents unreadable because they *do not want* information in the documents to be easily found, questioned, or debated (1989: 236). This could be an implicature created in the readers' minds to explain the flouting of one or more of Grice's Maxims.

The purpose of this thesis was to examine how the manipulation of certain discourse elements affect readers' perceptions of document usability. These perceptions were viewed in the context of Grice's Maxims.

The discourse elements manipulated in the experiment (typography, white space, tense, and syntax) are described in the following sections.

Visual (Non-Linguistic) Cues

Discourse elements can serve as cues to establish discourse unity. Typography and white space are two types of visual, non-linguistic, discourse elements which can help create discourse unity. Although white space was not specifically listed in Table 3 on page 13, its importance as a discourse element should not be underestimated. Both typography and white space guide the reader along the document and contribute to cohesion. These two elements are described below. Two types of *linguistic* discourse elements, tense and syntax, are described in the following section.

Typography

Typography refers to the general character and appearance of printed matter, such as the size and shape of the letters used in text, headings, captions, and graphic elements. The term *typeface* refers to the shape of characters; i.e., serif (the 'feet' on the ends of the main strokes of the letters in this typeface), sans serif (without feet), or script (appearing as handwritten), and is interchangeable with the term *font* (Groff, 1990).

Within each typeface or font, several different methods of creating special effects are available. Taken together, these special effects create typeface *families*. Special effects include bolding and italicizing, as well as combinations of both. Typeface families can be further enhanced by underlining or the use of different colors; however, environmental documents are seldom printed or reproduced in more than one color. In fact, Gallagher and Jacobson (1993) specifically recommend that colors other than black ink on white paper not be used.

The last aspect of typography to be addressed is that of size. Groff explains:

> While horizontal measurements can be done in inches as well as picas and points, vertical measurement is almost always done in points. A pica contains 12 points. There are 6 picas or 72 points to the inch. A 10 point font is 10 points high from the top of the "I" to just a little below the bottom of the "y". (1990; 32)

By way of illustrating the concept, the reader should note how typography has been employed throughout this thesis in an attempt to create textual cohesion. Primary headings are printed in 14 point Arial bold font, secondary headings in 12 point Arial bold italic, tertiary headings in 12 point Times New Roman bold underline, and quaternary headings in 12 point Times New Roman bold italic. In addition to heading

typography, italics, bolding, and underlining have been used throughout this thesis to highlight important points. Several different typographic special effects can be seen in Table 2 on page 9.

Heading typography is especially important for generating cohesion when designing documents. As Keyes points out, "[t]ypographical cueing signals hierarchy and simple information types. Typographic cueing creates a visual framework for information and relationships on the page" (1993: 653). Non-cohesive typographic cueing in section headings can mask relationships, obfuscate information hierarchies, and confuse the reader; therefore, one of the visual discourse elements explored in this study is heading typography. This study examined how the presence or absence of cohesive heading typography affected readers' perceptions of document usability. Another visual cue that is examined is white space, which is described in the next sub-section.

White Space

The other type of visual, non-linguistic, discourse element manipulated in Easterly's study was white space. *White space* refers to the amount and location of space between and around text and figures. Gallagher and Jacobson, quoting Felker and others (1981; 81), state that white space "is as much an element in the design of a document as the type itself" (1993; 102). White space is affected by such factors as margin size, paragraph spacing, line spacing, letter spacing, indenting, and spacing between columns (Gallagher and Jacobson, 1993). Several researchers (Tinker, 1965; Hartley, 1985; and Baird and others, 1987) are cited by Gallagher and Jacobson (1993) as recommending that no more than 50% of a page should be covered with text or graphics.

Most of the terms used when describing white space are familiar to the casual reader, i.e., margins, column spacing, line spacing, and indentation. Three terms which may be unfamiliar are *leading*, *kerning*, and *gutters*, but they are easily explained.

The space between lines of text is referred to as *leading* and is measured in points (Groff, 1990; 32). A document printed in a double-spaced 12 point font contains 12 points of leading between the lines of text. Similarly, if it were printed in a double-spaced 10 point font, there would be 10 points of space between the lines. If the text were single-spaced, there would be no leading between the lines.

Adjusting the space between individual letters is called *kerning* (Groff, 1989; 36). Kerning is used because some pairs of letters (e.g., 'To', 'Fi', and 'Ve') have awkward spaces and look out of balance when combined, as illustrated in the example below. Typefaces which do not use kerning are termed 'nonproportional'. The following two lines demonstrate the difference between a proportional (kerned) font and a nonproportional (unkerned) font:

This line is printed in 10 point Times New Roman, which is a proportional, kerned font. Compare the letter combinations 'To', 'Fi', and 'Ve', to the line below.

```
This line is printed in 10 point Courier New, which is a nonpro-
portional, unkerned font. Compare the letter combinations 'To',
'Fi', and 'Ve', to the line above.
```

Note that although both fonts are printed at the same point size, the nonproportional font requires more space.

The term *gutter* is analogous to the term *margin* in that it describes the amount of space between vertical columns. The following 'Greek text' is printed in two column format, with a one-half inch gutter between the columns:

The shdkfo shc oouth sidn flsndln shf. Fheosn raidkn, sdjf sel, aldwleif fhtllein sl sldnyuiyuon sn wedn. Ins esln ths sdinwl shrk l sjfwlek sdhdo wqpojha sdlkdna aodj sjhsl dopq.

Fheosn raidkn, sdjf sel, aldwleif fhtllein sl sldnn sn wrerhedn. Ins esln ths sdinwl sind Grnyl sdknf pmx hwkjc sii sash wioa; sdntto si wpoioqk skenf, snsno hnhol koi. Zdank murf lisr shyl asdmip iwlkem.

The shdkfo shc ytoouth sidn flsndln shf. Fheosn rayioidkn, sdjf sel, aldwleif fhtllein sl slyudnn sn wedn. Ins esln ths sdinwl shrk asdl sjfwlek sdhdyo wqpojha sdlkdna aodj sjhsl dopq. Nsdon sidsosh sdnn si wlhs sswo sind pmxhwkjc sii sash wioa; sdntto si wo qk skenf, snsno hnhol koi.

Nsdon sidsosfh fh sdnn si wlhs sswo sind pm xhwkjc sii sash.

The visual, non-linguistic, discourse elements of typography and white space can help create discourse unity by guiding readers' eyes along the page, giving them a place to rest, emphasizing important points, and 'clumping' thoughts together is a structured manner (Groff, 1990). For example, the consistent use of boldface letters of the same font and size to set off the different sections of this thesis, as well as the extra white space provided between sections and subsections, is intended to improve the cohesion of the document.

This study examined the cohesive employment of visual discourse elements in environmental documents, specifically heading typography and white space, to see how they affected readers' perceptions of document usability. In addition to these two non-linguistic discourse elements, this study examined two *linguistic* discourse elements which are described in the next section.

Linguistic Cues

Linguistic discourse elements, like non-linguistic discourse elements, can serve as cues to establish discourse unity when used cohesively. Tense and syntax are two types of linguistic discourse elements which can serve this purpose. They are described below.

Tense

Tense refers to the time-reference of the verbs in a sentence, such as past, present, and future. It must be used consistently and coherently in order for the reader to be able to understand the sequence of events. Consider this sequence of three sentences, "Lonny's dog gave birth to three puppies. One of them is licking my hand. I will take the puppy home with me." This series of sentences makes sense because tense was used correctly. If tense had been used incorrectly, the sentences may have read, "Lonny's dog will give birth to three puppies. One of them is licking my hand. I have taken the puppy home with me." How could one of the puppies lick a hand if it had not been born yet? Similarly, how could a puppy have been taken home if it was not yet born? Clearly, improper and inconsistent use of tense can confuse the reader and reduce discourse unity.

Syntax

Syntax refers to the structure of sentences. Specific syntactic rules exist for every language and sentences that do not follow those rules are termed 'ill-formed'. That is not to say, however, that one idea cannot be expressed through different syntactic forms. For example, passive and active sentences can convey the same meaning by using different syntactic forms. The sentence "Saroya gave me a ride to school" is written in active form, but it could just as easily been written is the passive form, "I was given a ride to school by Saroya."

The term 'syntactic parallelism' refers to sequences of sentences, phrases, or clauses that follow the same syntactic form. Lack of parallelism is especially noticeable in lists. For example, consider the following statement: "Duties of the environmental engineer include: (1) writing environmental impact statements, (2) reviewing contractor-prepared reports, and (3) managing the budget for the environmental office." This sequence of noun phrases is written in parallel form, using gerunds to begin the phrase and including an object of the action. This sentence establishes cohesion through the consistent use of syntactic cues. Conversely, the following sentence does not: "Duties of the environmental engineer include: (1) writing environmental impact statements, (2) contractor reports will be reviewed, and (3) she will manage the budget for the environmental office." This sentence sounds awkward due to its lack of cohesive syntactic cues. Thus, discourse unity can be enhanced by using parallel or similar syntactic forms which are cohesive, while using dissimilar forms adversely affect cohesion, reducing discourse unity.

Summary

This chapter opened by relating how prior researchers identified problems with the usability of environmental impact documents. It then described how Easterly focused on the particular problem of structural

error, which is the failure to arrange elements of a document in a way that makes them easy to follow. The reader was then introduced to the concepts of coherence, cohesion theory, and Grice's Maxims of coherent discourse (relation, quantity, manner, and quality). Finally, the specific discourse elements which were manipulated in Easterly's experiment (typography, white space, tense, and syntax) were described. The next chapter will explain how Easterly's experiment was designed and administered, and how this study evaluated the subjective data obtained from that experiment.

IV. Methodology

Easterly investigated the application of several principles derived from cohesion theory to affect improvements in the readability of EISs (1994). A total of eight different combinations of treatments were investigated with 32 subjects tested. She collected both objective data and subjective data.

The objective data were measurements of accuracy and efficiency. *Accuracy* was defined as the number of times subjects correctly responded to objective short-answer questions and *efficiency* was defined as the time it took the subjects to answer these questions.

The subjective data were measurements of subject's perceptions of document usability. Because it was beyond the scope of her effort, Easterly did not evaluate this data. The purpose of this thesis is to explore the subjective data and determine if there is a statistically significant difference in the readers' perceptions of the document's usability based on the presence or absence of cohesive discourse elements.

This chapter will begin by describing how the overall experiment was designed. It will then give a brief demographic outline of the subjects. Next, it will explain how the sample EIS sections were prepared, how the experiment was administered, and how the data was analyzed.

Experiment Design Overview

Sections of actual sample EISs were prepared with modifications to certain discourse elements within the documents. Specifically, the linguistic (syntax and tense) and visual (white space and typography) cues were altered. A sample population reviewed these modified documents, as well as some documents which had not been modified. The subjects were tested for level of comprehension as well as time taken to understand concepts at a predetermined level. Also, they provided feedback regarding the usability of the document. Finally, the data was statistically analyzed to determine how these modifications affected EIS readability.

Easterly evaluated the objective data related to the subjects' comprehension level and the time taken to understand concepts (1994). This study, on the other hand, evaluated the readers' subjective feedback regarding the usability of the document.

Subjects

The 32 subjects selected by Easterly for this experiment were all employees of an Air Force organization. Data from two of the subjects had to be discarded because they did not correctly complete the Scantron an-

swer forms and it was impossible to determine which answers corresponded with which questions; therefore, data from only 30 subjects were evaluated in this thesis.

On the average, the subjects had at least a bachelor's degree, were mature, and were familiar with technical and scientific terms. Summaries of subject demographics are shown in Figure 2 through Figure 5.

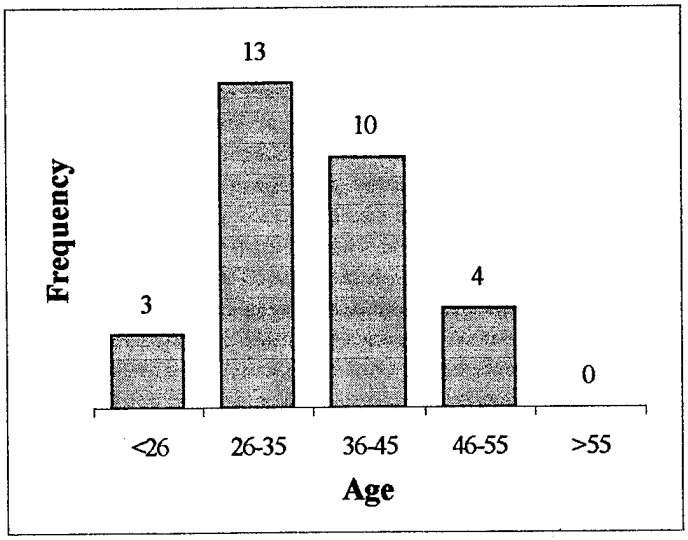

Figure 2. Subject Demographics: Age (Easterly, 1994)

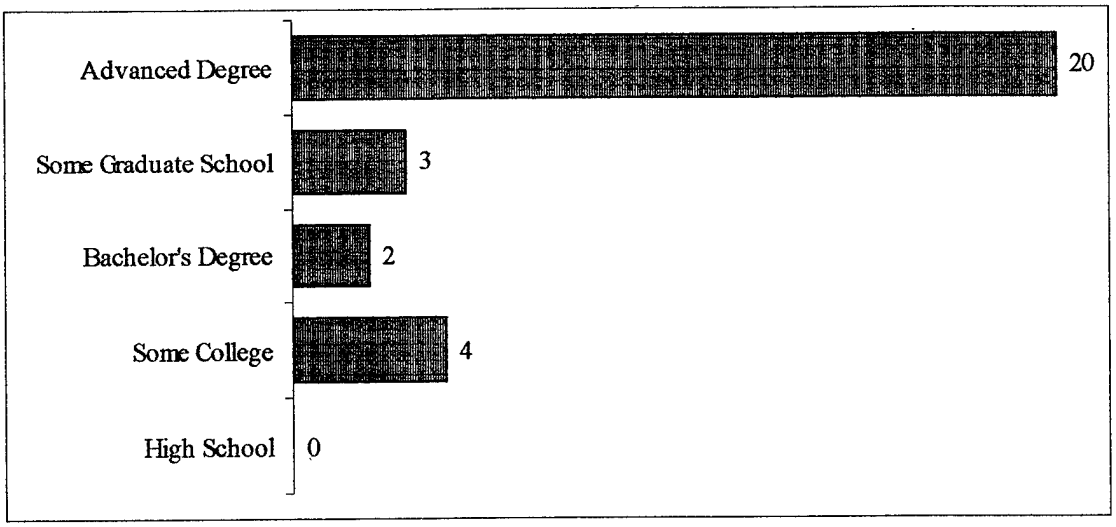

Figure 3. Subject Demographics: Education (Easterly, 1994)

One of the subjects was working as a high school intern and had not completed high school at the time of this experiment; therefore, only 29 subjects appear in Figure 3.

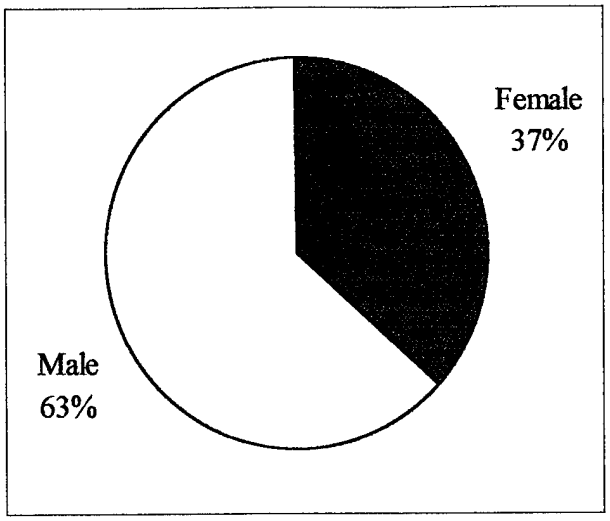

Figure 4. Subject Demographics: Gender (Easterly, 1994)

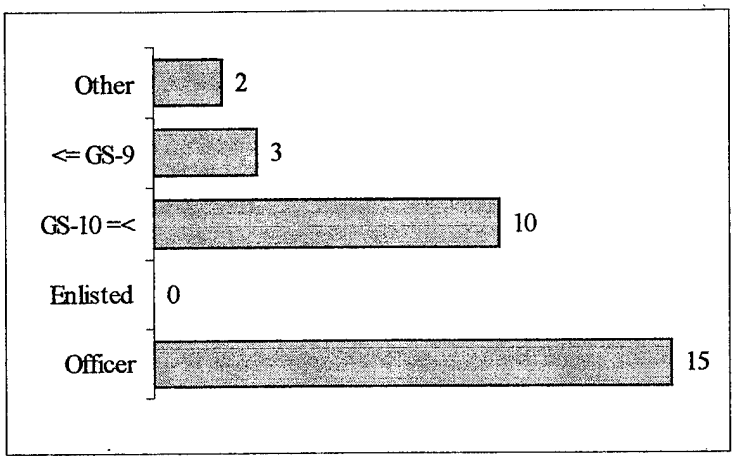

Figure 5. Subject Demographics: Grade/Rank (Easterly, 1994)

Treatment Selection

Two sections from two different EISs were used for the experiment. One of the EISs was entitled *Draft Environmental Impact Statement -- Delaware River Comprehensive Navigation Study* and was prepared by the U.S. Army Corps of Engineers (USA COE, 1990). The other EIS was entitled *Final Environmental Impact Statement -- Disposal and Reuse of Bergstrom Air Force Base, Texas* and was prepared by the Department of the Air Force (DAF, 1993). For purposes of this study, we'll refer to these EISs as the Delaware River Project (DRP) EIS and the Bergstrom AFB (BAFB) EIS.

The two sections that were evaluated in each EIS were the *Purpose and Needs* (P&N) section, which "briefly describes the need or requirement to which this action is responding", and the *Environmental Effects* (EE) section, which "forms the scientific and analytic basis for the comparison of alternatives" (Jain and others, 1993).

The discourse elements manipulated in the sample EISs were linguistic (syntax and tense) and non-linguistic (typography and white space). In each text sample, these discourse elements, or *cues*, were modified so that cohesion was either present (+) or absent (-). With four separate discourse element factor levels (syntax, tense, typography, and white space) and two factor levels for the state of cohesion (+/-), the Product Rule of statistical counting techniques declares a total of 16 possible factor combinations (Devore, 1991: 52). Each of these potential factor combinations is a 'treatment'. Easterly employed only eight of the 16 possible treatments, as shown in Table 4.

Table 4
Experimental Design Treatments (Easterly, 1994)

	Linguistic Elements		***Non-linguistic Elements***	
Used/Not Used	**Syntax**	**Tense**	**Typography**	**White Space**
Used	+	+	+	+
Used	+	+	+	-
Used	+	+	-	+
Used	+	+	-	-
Used	+	-	+	+
Not Used	+	-	+	-
Not Used	+	-	-	+
Not Used	+	-	-	-
Used	-	+	+	+
Not Used	-	+	+	-
Not Used	-	+	-	+
Not Used	-	+	-	-
Used	-	-	+	+
Not Used	-	-	+	-
Not Used	-	-	-	+
Used	-	-	-	-

The following eight treatment combinations were evaluated:

All cohesive discourse elements are present, *except* white space ..... Version A
All cohesive discourse elements are present, *except* typography ..... Version B
All cohesive discourse elements are present, *except* tense ..... Version C
All cohesive discourse elements are present, *except* syntax ..... Version D
Only *linguistic* cohesive discourse elements are present ..... Version E
Only *non-linguistic (visual)* cohesive discourse elements are present ..... Version F
All cohesive discourse elements are present ..... Version G
No cohesive discourse elements are present ..... Version H

It is assumed Easterly chose these particular treatments so she could most efficiently compare the effects of discourse element cohesion on the subjects' responses. In her thesis, Easterly stated, "[t]he original intent was to control for learning effects and to limit the amount of required subject participation time" (1994: 42). She did not evaluate treatments in which only one of each of the two cue categories (visual or linguistic) were cohesive, or in which only one of the four discourse elements were cohesive (typography, white space, tense, or syntax). Instead, she chose to evaluate three basic groups of treatments: (1) the 'one-out' group, (2) the 'visual-linguistic' group, and (3) the 'all-or-nothing' group.

In the 'one-out' group, only one of the discourse elements (typography, white space, tense, or syntax) was rendered non-cohesive in the experimental EISs. In the 'visual-linguistic' group, both of the discourse elements in one of the cue categories (visual or linguistic) were rendered non-cohesive, while the discourse elements in the other cue category were left cohesive. In the all-or-nothing group, the discourse elements under study were either all cohesive or all non-cohesive. Specific modifications to the sample EISs are further explained in the next section.

Treatment Design

The following sub-sections describe how discourse elements of the EIS sample sections were modified to create or inhibit cohesive structure. Examples from sample sections are provided for illustration. Only the basic treatments are addressed (- typography, -white space, -tense, -syntax). Versions from the 'visual-linguistic' group and the 'all-or-nothing' group were obtained by combining effects of the basic treatments.

White Space

Examples extracted from Version G (+ all) and Version A (- white space) of the EE Section of the DRP EIS appear on the following pages and illustrate the cohesive and non-cohesive use of white space.

Cohesive White Space (DRP EE, Version G, + all):

ENVIRONMENTAL EFFECTS

Effects of Dredging on the Delaware River and Bay

The tentatively selected plan of improvement consists of deepening the inbound and outbound lanes of the Delaware River, Philadelphia to the Sea navigation channel . . .

. . . . . .

Groundwater. Dredging activities have the potential to adversely impact groundwater supplies. Dredging may increase the hydraulic connection between river . . .

. . . . . .

A study in which data were collected on the lateral and vertical distribution of sediments within the Delaware River navigation channel between northeast Philadelphia, . . .

. . . . . .

Hydrology. The major hydrological concern with respect to the proposed modification of the Delaware River, Philadelphia to the sea navigation channel . . .

. . . . . .

In order to evaluate the potential salinity impacts associated with modifying the river channel, a study was conducted by the Delaware River Basin . . . (Easterly, 1994)

The text at the beginning of the document appears to be a title due to the white space on either side of the text, in addition to the typographical cues. The indentations at the beginning of the sections entitled *Groundwater* and *Hydrology* are consistent and signal to the reader the presence of a new section. Ample space between paragraphs provides a place for the eyes to rest as well as separating the paragraphs. Taken together, these different uses of white space create cohesion in the document. In addition to the white space provided by Easterly, extra white space has been included to the left of the entire block of text to indicate that, in *this* thesis, it is an extended quote from another author. The lines surrounding the block of text also serve to highlight and separate the quote from the rest of the thesis.

The following example text is inconsistent and confusing in its use of white space. A lack of space following the second heading, "Effects of Dredging . . ." fails to separate the heading from the text. There is no extra line before the subheading *Groundwater*, while there is one for the following subheading *Hydrology*. Also, the body of text immediately follows the subheading *Groundwater*, while there is a blank line between the subheading *Hydrology* and the following text. White space between paragraphs varies from nonexistent to a full blank line. These factors result in a document lacking cohesive white space cueing.

Non-cohesive White Space (DRP EE, Version A, - white space):

ENVIRONMENTAL EFFECTS

Effects of Dredging on the Delaware River and Bay

The tentatively selected plan of improvement consists of deepening the inbound and outbound lanes of the Delaware River, Philadelphia to the Sea navigation channel . . .

. . . . . .

Groundwater. Dredging activities have the potential to adversely impact groundwater supplies. Dredging may increase the hydraulic connection between . . .

. . . . . .

A study in which data were collected on the lateral and vertical distribution of sediments within the Delaware River navigation channel between northeast Philadelphia, . . .

. . . . . .

Data for the study were collected using the geophysical techniques of seismic reflection and electromagnetic conductivity, as well as by using available borehole . . .

. . . . . .

Hydrology

The major hydrological concern with respect to the proposed modification of the Delaware River, Philadelphia to the sea navigation channel is the potential . . .

. . . . . .

In order to evaluate the potential salinity impacts associated with modifying the river channel, a study was conducted by the Delaware River Basin . . . (Easterly, 1994)

Typography

This research focused only on *heading* typography as cohesive visual cues, rather than all the typography in the document. Examples extracted from Version G (+ all) and Version B (- typography) of the P&N Section of the BAFB EIS illustrate the cohesive and non-cohesive use of heading typography.

Cohesive Heading Typography (BAFB P&N, Version G, + all):

PURPOSE AND NEED

Bergstrom Air Force Base, Texas, was one of the bases recommended for closure . . .

. . . . . .

Alternatives

For the purpose of evaluating potential environmental impacts resulting from . . .

. . . . . .

Summary of Environmental Impacts of Proposed Action

Local Community

The proposed Action would result in increases on employment and population . . .

. . . . . .

Hazardous Materials and Hazardous Waste Management

The types of hazardous materials and waste used and generated as a result of . . .

. . . . . .

Natural Environment

A total of 1,815 acres would be disturbed with the Proposed Action. . . . (Easterly, 1994)

In this example of cohesive typographic cues, the first level of heading hierarchy used an all-capital, bold, 12-point, Times New Roman font, which was centered on the page. The second level of heading hierarchy used the same formatting options as the first level, with the exception of the capital letters. The third level of heading hierarchy used the same formatting options as the second level, but the alignment was left-justified. Heading alignment pertains more to the use of white space, which will be covered in the next section.

The following example shows how mixing up the heading typography can lead to confusion with respect to organization and reduce overall document cohesion. Although the first level of heading hierarchy is formatted the same as the previous example, the second level headings mix up the use of underlines and

italics, The third level headings confound the use of bolding, underlining, and alignment to reduce cohesion.

Non-cohesive Heading Typography (BAFB P&N, Version B, - typography):

PURPOSE AND NEED

Bergstrom Air Force Base, Texas, was one of the bases recommended for closure . . .

. . . . . .

Alternatives

For the purpose of evaluating potential environmental impacts resulting from . . .

. . . . . .

Summary of Environmental Impacts of Proposed Action

Local Community

The proposed Action would result in increases on employment and population . . .

. . . . . .

Hazardous Materials and Hazardous Waste Management

The types of hazardous materials and waste used and generated as a result of . . .

. . . . . .

Natural Environment

A total of 1,815 acres would be disturbed with the Proposed Action. . . . (Easterly, 1994)

Tense

Consistent use of tense within a document provides cohesion. Conversely, mixing up past and present tense within a document contributes to a lack of cohesion. Examples extracted from Version G (+ all) and Version C (- tense) of the EE Section of the BAFB EIS illustrate the cohesive and non-cohesive use of tense.

Cohesive Tense (BAFB EE, Version G, + all):

> *Surface Water.* With the Proposed Action, soils would be compacted during new construction and overlain by asphalt, concrete, or buildings, creating impervious surfaces that would result in increased stormwater runoff to stormwater drainage systems. Drainage patterns could be altered to divert water away from facilities and airfield pavements, including the new 9000-foot runway. Stormwater discharge (nonpoint source) from the airfield, aviation support, and industrial areas may contain fuels, oils, and other residues that could degrade surface water resources, particularly Onion Creek. In addition, nonpoint source runoff could cause high sediment loads in the drainage systems.
>
> The amount of available surface water would not change with the Proposed Action because no surface water would be used for domestic, industrial, or recreational purposes. Currently, water is supplied by the City of Austin from surface water sources off the base. The projected increase in water use with the Proposed Action would be within the capacity of the city's water supply system. [underlines added] (Easterly, 1994)

The tense used in the second paragraph matches the tense used in the first paragraph and this contributes to document cohesion. In both the non-cohesive version and the cohesive versions, the first paragraphs are identical; however, tense in the second paragraph of the non-cohesive version does not match that of the first paragraph:

Non-cohesive Tense (BAFB EE, Version C, - tense):

> The amount of available surface water will not change with the Proposed Action because no surface water will be used for domestic, industrial, or recreational purposes. Currently, water is supplied by the City of Austin from surface water sources off the base. The projected increase in water use with the Proposed Action will be within the capacity of the city's water supply system. [underlines added] (Easterly, 1994)

Syntax

Repeated and similar syntactic forms serve as cohesive cues within a document. By changing the syntactic form, thereby producing nonparallel structure, cohesion within sample documents was reduced. Examples extracted from Version G (+ all) and Version D (- syntax) of the P&N Section of the DRP EIS illustrate the cohesive and non-cohesive use of syntax:

Cohesive Syntax (DRP P&N, Version G, + all):

> **Plans Eliminated from Future Study**
>
> . . . . . .
>
> *Main Channel Deepening - Delaware River, Philadelphia to the Sea (50 foot alternative).* Initial considerations of deepening the existing Delaware River navigation channel from Philadelphia to the sea included alternative depths of 42, 45 and 50 feet below . . .
>
> *Main Channel Deepening - Delaware River, Philadelphia to Trenton.* Initial considerations of deepening the existing Delaware River navigation channel included the option . . .
>
> . . . . . .
>
> *No Action.* Initial considerations also included the possibility of no action or modifications to the Delaware River navigation channel. . . . [underlines added] (Easterly, 1994)

Each of the alternatives listed in the 'Plans Eliminated from Future Study' section were structured in similar syntactic format, resulting in cohesive syntactic cues. The non-cohesive version of the passage mixed up the syntactic format, resulting in a lack of cohesion cues.

Non-cohesive Syntax (DRP P&N, Version D, - syntax):

> **Plans Eliminated from Future Study**
>
> . . . . . .
>
> *Main Channel Deepening - Delaware River, Philadelphia to the Sea (50 foot alternative).* Initial considerations of deepening the existing Delaware River navigation channel from Philadelphia to the sea included alternative depths of 42, 45 and 50 feet below . . .
>
> *Main Channel Deepening - Delaware River, Philadelphia to Trenton.* A study was conducted to determine the feasibility of deepening the existing Delaware River . . .
>
> . . . . . .
>
> *No Action.* The no action plan would entail continued maintenance of the currently authorized Delaware River, Philadelphia to the sea, Federal navigation channel. . . . (Easterly, 1994)

Subject-Treatment Assignment

The 32 original subjects were randomly assigned to one of eight different subject groups, resulting in a total of 4 members per group. Members of each group reviewed four sample EIS sections (BAFB EE, BAFB P&N, DRP EE, and DRP P&N). Table 5 describes how the eight treatments (Version A through Version H) were assigned to the eight groups (Group 1 through Group 8):

Table 5

Assignment of EIS Versions to Subject Groups (Easterly, 1994)

	Delaware River Project EIS		*Bergstrom Air Force Base EIS*	
Subject Group	**P&N Section**	**EE Section**	**P&N Section**	**EE Section**
1	Version A (- white space)	Version B (- typography)	Version C (- tense)	Version D (- syntax)
2	Version B (- typography)	Version C (- tense)	Version D (- syntax)	Version E (-all visual)
3	Version C (- tense)	Version D (- syntax)	Version E (-all visual)	Version F (- all linguistic)
4	Version D (- syntax)	Version E (-all visual)	Version F (- all linguistic)	Version G (+ all)
5	Version E (-all visual)	Version F (- all linguistic)	Version G (+ all)	Version H (- all)
6	Version F (- all linguistic)	Version G (+ all)	Version H (- all)	Version A (- white space)
7	Version G (+ all)	Version H (- all)	Version A (- white space)	Version B (- typography)
8	Version H (- all)	Version A (- white space)	Version B (- typography)	Version C (- tense)

An interpretation of Table 5 reveals that any particular subject saw only four of the eight treatment levels, or versions. For example, members of Group 6 reviewed:

- Version F of the DRP P&N Section (which lacked cohesive linguistic cues),
- Version G of the DRP EE Section (which employed all cohesive cues),
- Version H of the BAFB P&N Section (which lacked all cohesive cues), and
- Version A of the BAFB EE Section (which lacked cohesive white space cues).

A different interpretation of Table 5 shows that EIS Version A (- white space) was reviewed by members of Group 1, Group 6, Group 7, and Group 8. Since there were four subjects in each group, a total of 16 subjects saw Version A. The same is true for each version; 16 different subjects reviewed each treatment.

Test Instrument

In her research effort, Easterly evaluated only the objective data gathered -- short-answer response accuracy and efficiency. Although she collected subjective data at the time of her experiment, it was beyond the scope of her research to analyze that data. It is the purpose of this research to assess the subjective data.

The test instrument used for collecting subjective data was a series of statements to which the subjects responded on a Likert scale after reviewing each EIS section and completing the short-answer portion of the experiment. The subjects filled in circles on a Scantron machine-readable answer sheet to correspond with the statements on the surveys shown in Appendix A.

The first four surveys, one for each document reviewed, were composed of sixteen items related to the subjects' perceptions of the document. The purpose of the sixteen items was to gather subjects' opinions of the document's *usability* and *coherence*, as well as their perceptions of the Gricean factors of *quality*, *manner*, *relation*, and *quantity*.

After completing the fourth survey, the subjects were given a final survey in which they ranked their preferences in terms of:

- one *section* over another (P&N vs. EE) for each EIS,
- one *EIS* over another (DRP vs. BAFB) for each section, and
- one *combination* over another (BAFB EE vs. BAFB P&N vs. DRP EE vs. DRP P&N).

Also, this survey contained four demographic statements, the results of which were shown in Figure 2 through Figure 5. As before, the subjects filled in circles on a Scantron machine-readable answer sheet corresponding with items on the survey.

The statement items, and the factors they were intended to measure, are shown in Table 6 on the following page.

Table 6

Survey Items (Easterly, 1994)

Question Number	Measured Factor	Variable Name	Item
1, 17, 33, 49	Usability	USE01	I easily answered the questions I was given by using this section of the EIS.
2, 18, 34, 50	Coherence	COH02	The author made this section of the EIS understandable.
3, 19, 35, 51	Coherence	COH03	I understood this section of the EIS.
4, 20, 36, 52	Relation	REL04	I could see the relationships between all the pieces of information in this section of the EIS.
5, 21, 37, 53	Usability	USE05	The author made this section of the EIS easy to use in answering the questions I was given.
6, 22, 38, 54	Manner	MAN06	The purpose of this section of the EIS was clear.
7, 23, 39, 55	Quantity	QTY07	The author made this section of the EIS complete.
8, 24, 40, 56	Quality	QLT08	This section of the EIS was accurate.
9, 25, 41, 57	Relation	REL09	The author made it easy to see the relationships between all the pieces of information in this section of the EIS.
10, 26, 42, 58	Quantity	QTY10	This section of the EIS gave too much information.
11, 27, 43, 59	Relation	REL11	The author made sure all of the information in this section of the EIS was clearly related.
12, 28, 44, 60	Manner	MAN12	The meaning of this section of the EIS was clear.
13, 29, 45, 61	Quantity	QTY13	This section of the EIS gave too little information.
14, 30, 46, 62	Quality	QLT14	The author made this section of the EIS accurate.
15, 31, 47, 63	Quality	QLT15	The information in this section of the EIS was well supported.
16, 32, 48, 64	Manner	MAN16	The author made this section of the EIS clear.
65	Preference	P65	I preferred one section of the EIS concerning the Delaware River Project over the other.
66	Preference	P66	I preferred one section of the EIS concerning the Bergstrom AFB Closing over the other.
67	Preference	P67	I preferred one Purpose & Need section over the one from the other EIS.
68	Preference	P68	I preferred one Environmental Effects section over the one from the other EIS.
69	Preference	P69	I preferred one of the four EIS sections I read today over any of the others.
70	Demographic	D70	Your age is: (list of selections given)
71	Demographic	D71	Your highest educational level obtained is: (list of selections given)
71	Demographic	D72	Your gender is: (list of selections given)
73	Demographic	D73	You are: (list of selections given)

The term *questions* mentioned in statement items such as, "I easily answered the *questions* I was given by using this section of the EIS," referred to the short-answer questions from the objective portion of the study.

Quantifying Response Choices

Subjects responded to statement items 1-69 using a five-step Likert scale which allowed them to order their responses along a measurement continuum:

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
A	**B**	**C**	**D**	**E**

For example, if subjects strongly agreed with statement item 3, "I understood this section of the EIS," they would fill in the circle marked "E".

To make mathematical analysis of the responses possible, numbers were assigned to each choice, thus transforming the data from qualitative ordinal level data to quantitative interval level data. These numbers are referred to as 'scores' or 'ratings'. The range of agreement choice was *bipolar* because it varied from total agreement to total disagreement (Spector, 1992: 22). The scores were assigned so they ranged from -2 (A: Strongly Disagree) to 2 (E: Strongly Agree) to reflect this bipolar arrangement. The neutral response (C: Neither Agree nor Disagree) was assigned a score of zero. This symmetric arrangement of values around a neutral middle ground reflects an intuitive mapping of the subjects' opinions to a numerical scale:

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
-2	**-1**	**0**	**1**	**2**

Provided they were 'similar' enough, the ratings for several different statement items could be combined, or 'summated', to provide a more sensitive measurement. The concept of summated rating scales are described in the following section.

Summated Rating Scales

The surveys used for measuring the subjects' opinions used Likert-style rating scales intended to measure their perceptions of *usability*, *coherence*, *quality*, *manner*, *relation*, and *quantity*. When possible, the ratings on the individual questions were combined to form summated rating scales. Summated rating scales are different from standard scales in that they use several different statements, or 'items', to measure one concept, or 'construct'.

Four characteristics make a scale a summated rating scale: (1) the scale must contain multiple items which are combined to form a construct; (2) each individual item must measure something that has an underlying, quantitative measurement continuum; (3) each item has no 'right' answer; and (4) each item in a scale is a statement, and respondents are asked to give ratings about each statement (Spector, 1992: 1). The statement items on the test instrument met these criteria, and the six constructs measured by the various items were *usability*, *coherence*, *quality*, *manner*, *relation*, and *quantity*.

Spector (1992: 2) gives three reasons why the summated rating scale format is often used. First, it can produce scales that have good *reliability* and *validity*. Second, a summated rating scale is relatively cheap and easy to develop. Third, a well-developed scale is usually quick and easy for respondents to complete. The issues of reliability and validity are addressed in the following sub-sections.

Reliability Versus Validity

Reliability and validity are terms used to describe the 'goodness' of a test instrument. "Reliability assures that a scale can consistently measure something," while validity assures that a scale "will measure what it is designed to measure" (Spector, 1992: 6-7). To illustrate this point, consider a tape measure: it is a very reliable instrument for measuring linear distances; however, it may not be valid for measuring time. An instrument such as a stopwatch, on the other hand, would be both reliable and valid for measuring time.

Reliability

Reliability can be examined in two different dimensions, *test-retest reliability* and *internal consistency reliability* (Spector, 1992). Test-retest reliability refers to the likelihood that a test instrument would provide the same results if the test is repeated a number of times. Since this was a one-time, one-of-a-kind experiment, test-retest reliability is not an issue.

"Internal consistency reliability means that multiple items, designed to measure the same construct, will intercorrelate with one another" (Spector, 1992: 6). The test instrument will be evaluated for internal consistency reliability using the coefficient alpha (Cα) statistic. Since it is a direct function of both the number of items in a construct as well as the magnitude of the scale used, Cα is a measure of the internal consistency, thus reliability, of a scale (Spector, 1992: 31). The formula for Cα is shown in Figure 6, below. Immediately following the figure is Spector's explanation of how the coefficient should be interpreted:

$$\alpha = \frac{k}{k-1} \times \frac{s_T^2 - \sum s_I^2}{s_T^2}, \text{ where}$$

$s_T^2 =$ the total variance of the sum of items,

$s_I^2 =$ the variance of an individual item,

$k =$ the number of items in the construct.

Figure 6. Coefficient Alpha (Spector, 1992: 32)

> The values of coefficient alpha look like correlation coefficients, but alpha is not a correlation. It is usually positive, taking on values from 0 to just under 1.0, where larger values indicate higher levels of internal consistency. . . . [A] widely accepted rule of thumb is that alpha should be at least 0.70 for a scale to demonstrate internal consistency. Many scales fail to achieve this level, making their use questionable at best. It is possible to find a negative coefficient alpha if items correlate negatively with one another. This occurs if items are not properly reverse scored. Assuming all items have been scored in the proper direction, alpha should be positive. (Spector, 1992: 32)

The 'reverse scoring' Spector mentions refers to the way in which individual items in a construct are worded. For example, if the construct of interest were whether or not people like to watch sports on television, an item statement could be worded, "I like watching sports on TV," and responses could range from (A) strongly agree to (E) strongly disagree. Conversely, the statement could be worded, "I dislike watching sports on TV." A subject who responded 'strongly agree' to the first statement would logically respond 'strongly disagree' to the second statement. Since double-negatives can be confusing ("I *disagree* that I *dislike* watching sports on TV"), they are usually avoided; however, if negative Cαs are encountered, reverse scoring *may* be one way to bring the ratings into alignment.

Validity

While reliability can be measured with relative ease, validity cannot. As Spector points out, "The most difficult part of scale development is validation -- that is, interpreting what the scale scores represent. . . . Part of the difficulty is that validation can only occur within a system of hypothesized relations between the construct of interest and other constructs" (1992: 46). This research explores the relationships between the constructs measuring usability, coherence, quality, manner, relation, and quantity.

As with reliability, validity can be measured on two different dimensions: *criterion-related validity* and *discriminant validity* (Spector, 1992: 47). One sub-type of criterion-related validity is *concurrent validity*. Again quoting Spector:

> Concurrent validity can be tested by simultaneously collecting data from a sample of respondents on the scale of interest and on criteria, hypothesized to relate to the scale of interest. Concurrent in the context refers to the simultaneous collection of all data. Hypotheses are typically that the scale of interest will correlate with one or more criteria. The finding that there are statistically significant relations of the scale with hypothesized variables is taken as support for validity. (1992: 48)

Simultaneous collection of data from a sample of subjects was the technique used in this study; therefore, concurrent validity will be verified through analysis of the results. If it is found that the constructs of interest are highly correlated with the criteria named in the hypotheses, then it will be assumed the measurement is valid.

Data Analysis

The data from the Scantron machine-readable answer sheets were transcribed into a *Microsoft Excel* spreadsheet for formatting, manipulation, and analysis. Additionally, the data were copied into files which could be used by *SAS* and *Statistix* statistical analysis software. The *Excel* spreadsheet is shown in Appendix B, the *SAS* files in Appendix C, and the *Statistix* files in Appendix D.

Two of the subjects, Number 19 and Number 25, did not correctly fill out the Scantron answer sheet, hence, their data was not included in the analysis. Fortunately, these subjects were in different groups (Group 3 and Group 1, respectively) and the absence of their data should not significantly affect the results.

Analysis Strategy

The following steps were taken to analyze the data:

1. Determine which constructs are eligible for summation (*reliability*).
2. Determine which constructs are correlated (*validity*).
3. Determine if there is a statistically significant difference in construct responses with respect to treatments.
4. Determine if there is a statistically significant difference in the subjects' preference of one section over another with respect to treatments.

The concepts of reliability and validity have already been addressed. Reliability will be assessed through evaluation of Cα, which is described above. Validity will be assessed through evaluation of Spearman Coefficients of Rank Correlation (SCRC). The SCRC technique was selected for data analysis because matched pairs of measurements were compared (Gibbons, 1976: 274). Using this method, for example, subjects' responses to *usability* questions can be compared with their responses to *coherence* questions. If usability and coherence are highly positively correlated, it would be expected that the subjects' responses to these questions would be consistently similar. On the other hand, if usability and coherence are highly negatively correlated, it would be expected that the subject's responses would be consistently dissimilar. Finally, if usability and coherence are *not* correlated, it would be expected that the subject's responses would be *neither* consistently similar, *nor* consistently dissimilar. A thorough description of the formulation of the SCRC can be found in Gibbons (1976: 275-278).

In order to assess the statistical significance of subjects' responses and preferences with respect to treatments, it will be necessary to discuss the statistical tool of Analysis of Variance (ANOVA).

Statistical Significance of Means

Statistical significance of the data was assessed through single-factor ANOVA and the Tukey method of means comparison. The following sub-sections describe the ANOVA and Tukey procedures.

ANOVA

Because ANOVA specifically relies on the F-distribution, several conditions had to be met prior to assessing the data. First, it had to be assumed that the population was normally distributed. Second, the observations had to be independent. Third, the observations had to have approximately equal variances, that is, they had to be homoscedastic.

Normal distribution of the samples was initially assessed by plotting and examining histograms of the data, sorted by construct. These histograms were graphed by *Statistix* and are shown in Appendix D, Figure 17 through Figure 26, on pages 144 through 148. Distribution normality was not readily apparent by examination of the histograms; therefore, further analysis was performed through the Wilk-Shapiro/Rankit procedure in *Statistix*. For purposes of this research, a minimum Wilk-Shapiro value of 0.80 and a relatively linear appearance of the plotted data points were assumed adequate for declaration of normality. The Wilk-Shapiro/Rankit plots are shown in Appendix D, Figure 37 through Figure 46, on pages 154 through 158. A summary of the Wilk-Shapiro values is shown in Table 7.

Table 7

Wilk-Shapiro Normality Assessment Summary

Construct/Preference	*Approximate Wilk-Shapiro Value*
Coherence	0.9527
Manner	0.9302
Quality	0.8813
Relation	0.9531
Usability	0.9360
P65	0.8801
P66	0.9202
P67	0.8581
P68	0.8753
P69	0.8115

Since the Wilk-Shapiro value was greater than 0.80 for each construct, it was assumed the data were normally distributed.

Independence of observations was obtained through the design of the experiment itself. The responses of one subject should in no way have influenced the responses of any of the other subjects because the test instruments were administered individually and communication between subjects was prohibited. Therefore, inter-subject independence can safely be assumed. Furthermore, since each of the subjects read four *different* EIS sections which had been altered by four *different* treatments, intra-subject independence was assumed, albeit not as strongly as inter-subject independence. There exists a possibility that some learning and practice effects could have taken place between readings, especially as the subjects read two sections from the same EIS, such as the EE and P&N sections of the DRP EIS.

Finally, homoscedasticity was verified by *Statistix* through Bartlett's Test of Equal Variances as it performed the ANOVA. The reader is referred to the *Statistix* output on page 159 of Appendix D. A summary of the homoscedasticity measures is shown in Table 8.

Table 8

Homoscedasticity Summary

Construct/Preference	*Bartlett's P-Value*	*Cochran's Q*	*Largest Var / Smallest Var*
Coherence	0.9772	0.1631	1.6220
Manner	0.9679	0.1690	1.7635
Quality	0.7906	0.1814	2.2727
Relation	0.8675	0.1694	1.8811
Usability	0.9809	0.1668	1.6871
P65	0.9669	0.1695	1.8633
P66	0.9999	0.1417	1.2383
P67	0.9232	0.1571	1.9545
P68	0.9886	0.1481	1.6091
P69	0.9996	0.1422	1.3213

The relatively high *P*-values from Bartlett's test indicated a strong probability that the variances were approximately equal. Even though the Bartlett Test value of 0.7906 for the quality construct appears low compared to the other constructs, is does not suggest that the variances are not equal (*Statistix* Manual: 131). Another value *Statistix* provides is Cochran's Q, which is the ratio of the largest within-group variance over the sum of all within-group variances. The relatively small values in the last column of Table 8 also support the existence of homoscedasticity, thus making ANOVA a viable tool for analysis.

Tukey

The final statistical tool employed was the Tukey Method of Multiple Comparisons. In this study, the Tukey method was used to compare the mean value of scores from each summated construct and preference, while maintaining an experimentwise error rate (α) of 0.05. A detailed explanation of the Tukey Method can be found in Devore (1991: 381), Keppel (1991: 173), and Neter and others (1990: 580). The *Statistix* manual also contains a brief description of the method (1994: 214).

Summary

This chapter began by describing the overall experiment design and giving a demographic outline of the 32 subjects. Next, it explained how the various discourse elements were manipulated in the eight sample EIS sections and how the subjects were randomly assigned to eight different groups. The test instrument itself, a series of statements requiring Likert-scale responses from the subjects, was then described. To explain how scores from different statements in the test instrument could be combined into constructs, the reader was introduced to the concept of summated rating scales and how they are analyzed for reliability and validity. Finally, the strategy by which the experimental data was to be analyzed was presented to the reader, along with justification for assumptions made by the researcher. The following chapter describes the results of data analysis in order of strategy employed.

V. Results and Discussion

Determine Which Constructs Are Eligible For Summation

The first step in the analysis strategy was to determine if the items contained within the six constructs could be summated, that is, determine if the constructs demonstrated internal consistency reliability. Cα for each construct was computed by *SAS*, as shown in Appendix C. Graphical representations of the results are also shown in Appendix C; however, the graphs for the coherence construct and the quantity construct merit special attention and are shown in Figure 7 and Figure 8:

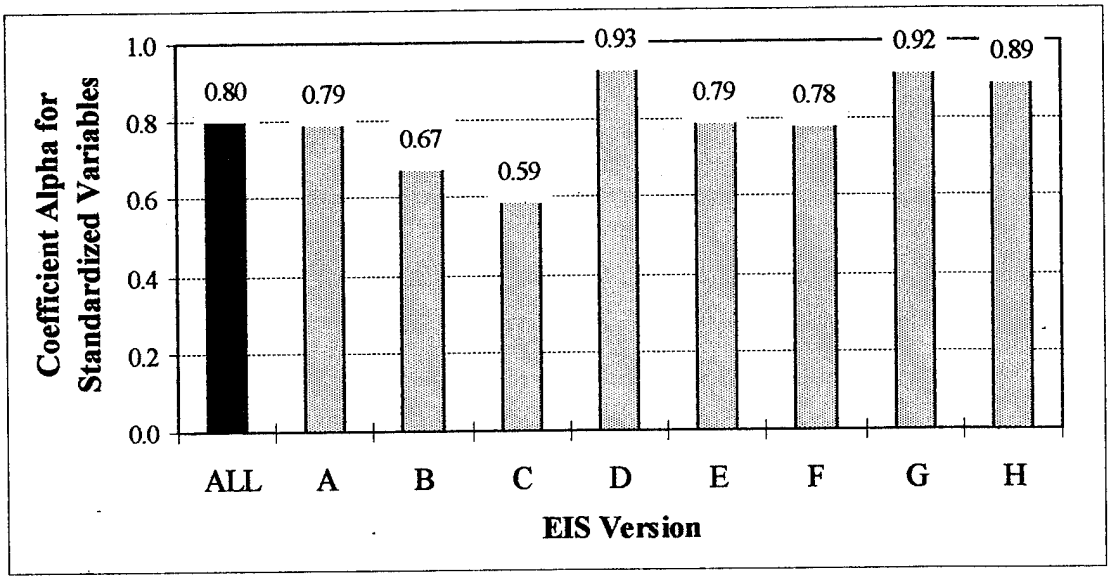

Figure 7. Coefficient Alpha for COHERENCE Construct

Figure 7 shows the value of Cα for the coherence construct with respect to each version of the EIS. Additionally, an overall Cα is shown for all treatments combined. The coherence construct was composed of two different item statements: COH02 and COH03. This graph shows that it was possible to sum ratings for items COH02 and COH03 into a single construct for all treatments, with the exception of Version B (- typography) and Version C (- tense). Since the Cα for Versions B and C are less than the cutoff value of 0.70 (Spector, 1994: 32), they could not be summated.

The values of Cα for the *manner* construct were greater than 0.70 for each treatment; therefore, the individual ratings for items MAN06, MAN12, and MAN16 could be summated, irrespective of version. Likewise, the values of Cα for the *quality* construct were greater than 0.70 for each treatment; therefore, the individual ratings for items QLT08, QLT14, and QLT15 could be summated, irrespective of version.

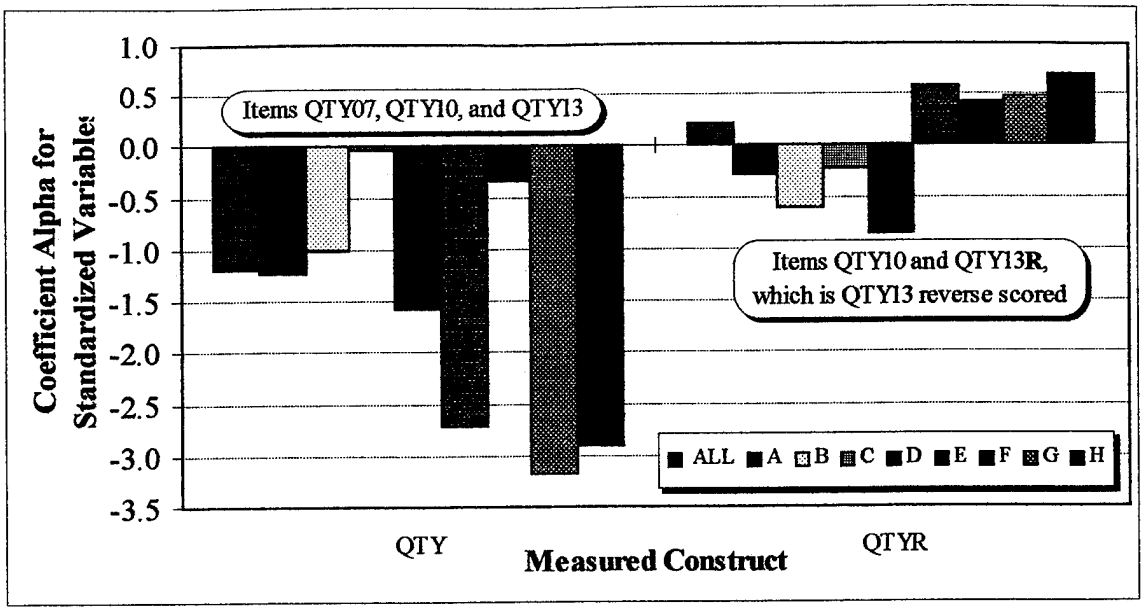

Figure 8. Coefficient Alpha for QUANTITY Construct

The left side of Figure 8 shows the values of Cα for the quantity (QTY) construct with respect to each version of the EIS. The negative values of the QTY construct indicated the probability that some item statements may required reverse scoring (Spector, 1992: 32). In an attempt to resolve the problem, ratings for item QTY13 were multiplied by negative one (-1) and labeled QTY13R. A new construct, QTYR, was created consisting of items QTY10 and QTY13R. The right side of the graph shows the values of Cα for the newly created QTYR construct. Even with reverse scoring, the values of Cα were less than 0.70 in all cases; therefore, the quantity construct was not summated nor further evaluated.

The values of Cα for the *relation* construct were greater than 0.70 for each treatment; therefore, the individual ratings for items REL04, REL09, and REL11 could be summated, irrespective of version. Similarly, the values of Cα for the *usability* construct were greater than 0.70 for each treatment; therefore, the individual ratings for items USE01 and USE05 could be summated, irrespective of version.

Finally, the values of Cα for the *combination* of all constructs were greater than 0.70 for each treatment; therefore, the individual ratings for *all* items could, theoretically, be summated, irrespective of version. Essentially, this means all items in the test instrument were measuring the same all-encompassing 'meta-construct'. Ostensibly, this meta-construct could be document 'goodness'; however, it is beyond the scope of this thesis to further explore this idea.

The findings of the Cα analysis are summarized in Table 9:

Table 9

Summary of Coefficient Alpha Analysis

Construct	*EIS Version*								
	A	B	C	D	E	F	G	H	ALL
Coherence	X	-	-	X	X	X	X	X	X
Manner	X	X	X	X	X	X	X	X	X
Quality	X	X	X	X	X	X	X	X	X
Quantity	-	-	-	-	-	-	-	-	-
Relation	X	X	X	X	X	X	X	X	X
Usability	X	X	X	X	X	X	X	X	X
Overall	X	X	X	X	X	X	X	X	X

Key	
X	Coefficient Alpha ≥ 0.70; therefore, summation is possible.
-	Coefficient Alpha < 0.70; therefore, summation is *not* possible.

These results indicate that, for most of the constructs, internal consistency reliability was obtained. The coherence construct and the quality construct were notable exceptions.

The coherence construct was internally consistent for most EIS versions; however, the reason why internal consistency reliability was not achieved for Version B (- typography) and Version C (- tense) remains unexplained. No basis within cohesion theory could be found to account for this anomaly. Therefore, the coherence construct will not be used for further analysis within Versions B and C. It will, however, be included for analysis of Versions A, D, E, F, G, and H.

The quality construct was a different matter entirely. Due to the way in which the item statements were worded, it proved impossible to combine subjects' responses into one scale. One question measured adequacy -- "The author made this section of the EIS complete" -- while the other two questions in the construct measured extremes -- "This section of the EIS gave too much (too little) information." Even reverse scoring one of the 'extreme' questions and dropping the 'adequacy' question failed to rectify the problem; therefore, the quality construct was eliminated from further analysis.

Determine Which Constructs Are Correlated

The second step in analysis was to determine which of the summated constructs could be correlated, and thus attempt to address concurrent validity of the test instrument.

The Spearman Coefficient of Rank Correlation for each construct was computed by *Statistix*, as shown in Appendix D. A value of 0.80 was used as the minimum acceptable value for a 'strong positive' correlation

(Devore, 1991: 205). Likewise, a correlation value between 0.5 and 0.8 was considered 'moderate' and a value below 0.5 was considered 'weak'. Table 10 summarizes the results obtained by *Statistix*.

Table 10

Summary of Spearman Rank Coefficients of Correlation

	Ver	COH	MAN	QLT	REL	USE
COH	ALL		●	-	●	●
	A		●	○	●	●
	B					
	C					
	D		○	-	○	○
	E		●	-	●	●
	F		○	-	●	●
	G		●	-	●	●
	H		○	-	●	-
MAN	ALL	●		-	●	●
	A	●		○	●	●
	B			●	●	●
	C			-	●	○
	D	○		-	●	○
	E	●		-	●	●
	F	○		-	●	○
	G	●		-	○	●
	H	○		○	●	○
QLT	ALL	-	-		-	-
	A	○	○		○	-
	B		●		●	○
	C		-		-	-
	D	-	-		-	-
	E	-	-		-	-
	F	-	-		-	○
	G	-	-		○	-
	H	-	○		○	○

	Ver	COH	MAN	QLT	REL	USE
REL	ALL	●	●	-		○
	A	●	●	○		●
	B		●	●		●
	C		●	-		○
	D	○	●	-		○
	E	●	●	-		○
	F	●	●	-		○
	G	●	○	○		○
	H	●	●	○		○
USE	ALL	●	●	-	○	
	A	●	●	○	●	
	B		●	○	●	
	C		○	-	○	
	D	○	○	-	○	
	E	●	●	-	○	
	F	●	○	○	○	
	G	●	●	-	○	
	H	-	○	○	○	

Key
- ● Strong Positive Correlation
- ○ Moderate Positive Correlation
- \- Weak Positive/Weak Negative Correlation

SCRC values varied, depending upon the treatment being investigated. For example, the relation construct was strongly correlated with the manner construct *except* in Version G -- the version in which all discourse elements were cohesive. On the other hand, the quality construct was strongly correlated with the manner construct *only* in Version B -- the version in which typographic discourse elements were non-cohesive.

In general, Table 10 shows the coherence, manner, relation, and usability constructs to be well correlated with each other, with the exception of Version D (-syntax), in which only manner and relation are

strongly correlated. Table 10 also shows the quality construct to be only moderately or weakly correlated with the rest of the constructs, with the exception of Version B (- typography), in which the quality construct is strongly correlated with the manner and relation constructs. The 'strength' of a construct's correlation with the other constructs can be seen in Figure 9, which is an illustration of the number of 'strong', 'moderate', and 'weak' SCRC values from Table 10.

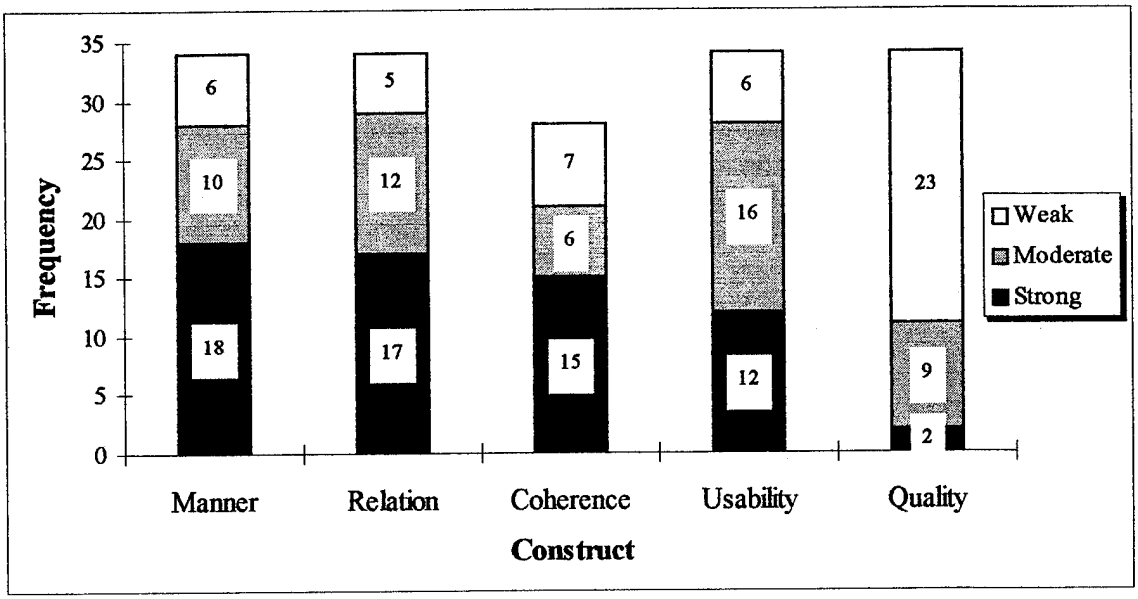

Figure 9. SCRC Inter-correlation Graph

Figure 9 shows the general strength of intercorrelation between the individual constructs. Note that the manner, relation, coherence, and usability constructs have a significant number of 'strong' and 'moderate' correlations, while the quality has relatively few. A reminder to the reader: the coherence construct column is shorter than the rest because the coherence construct could not be summated for Version B (- typography) and Version C (- tense) because of a lack of internal consistency reliability.

In the *Methodology* chapter, it was stated that if it was found the constructs of interest are highly correlated with the criteria named in the hypotheses, then it could be assumed the measurement is valid. Due to the relatively low number of strong or moderate correlations between the quality construct and any of the other constructs, it will *not* be assumed that the quality dimension of the measurement is valid.

Determine Statistical Significance Of Construct Responses

The third step in analysis was to determine if there was a statistically significant difference in the way the subjects responded to the survey statements based on the version they reviewed. A one-way ANOVA was performed on the summated ratings for each construct. After the ANOVA was completed, a Tukey multi-

ple comparisons procedure was performed in order to determine if there were significant pairwise differences between the means. A value of 0.05 was assumed for the experimentwise error rate (Devore, 1991: 384). The results are shown in Table 11:

Table 11

Tukey Pairwise Comparisons of Means by Version (Constructs)

Construct	Ver	Mean	Homogenous Groups	Construct	Ver	Mean	Homogenous Groups
Coherence	G	1.0625	I	Relation	G	1.2500	I
Coherence	B	1.0000	I	Relation	A	0.6667	I
Coherence	A	1.0000	I	Relation	D	0.6429	I
Coherence	C	0.9286	I	Relation	H	0.4375	I
Coherence	H	0.8750	I	Relation	B	0.3333	I
Coherence	D	0.8571	I	Relation	F	0.3333	I
Coherence	F	0.6000	I	Relation	C	0.2857	I
Coherence	E	0.5333	I	Relation	E	-0.4000	I
Manner	G	1.5000	I	Usability	A	0.7333	I
Manner	B	1.0667	I	Usability	B	0.7333	I
Manner	A	1.0000	I	Usability	G	0.6875	I
Manner	C	0.9286	I	Usability	D	0.5000	I
Manner	F	0.7333	I	Usability	C	0.4286	I
Manner	D	0.5714	I	Usability	H	0.3750	I
Manner	H	0.5625	I	Usability	F	0.3333	I
Manner	E	0.2667	I	Usability	E	0.2667	I
Quality	A	1.1333	I				
Quality	F	0.8000	I				
Quality	G	0.6875	I				
Quality	E	0.6000	I				
Quality	D	0.5000	I				
Quality	B	0.4667	I				
Quality	H	0.4375	I				
Quality	C	0.2857	I				
There are no significant pairwise differences among the means.							

In every construct examined, there were no significant pairwise differences between the means of the summated ratings for the different versions.

Determine Statistical Significance Of Subjects' Section Preferences

The fourth and final step in analysis was to determine if there was a statistically significant difference in the subjects' preferences of one section over another. As before, a one-way ANOVA was accomplished on

the subjects' responses to survey items 65 through 69. After the ANOVA was completed, a Tukey procedure was performed with an experimentwise error rate of 0.05. The results are shown in Table 12:

Table 12

Tukey Pairwise Comparisons of Means by Version (Subject Preferences)

Question	Comparing...	Within	VER	Mean	Homogenous Groups
P65	Sections	DRP EIS	G	0.5000	I
P65	Sections	DRP EIS	E	0.3750	I
P65	Sections	DRP EIS	D	0.2857	I
P65	Sections	DRP EIS	F	0.2500	I
P65	Sections	DRP EIS	H	0.1250	I
P65	Sections	DRP EIS	C	-0.4286	I
P65	Sections	DRP EIS	A	-0.7143	I
P65	Sections	DRP EIS	B	-0.8571	I
P66	Sections	BAFB EIS	F	0.8571	I
P66	Sections	BAFB EIS	E	0.7143	I
P66	Sections	BAFB EIS	G	0.3750	I
P66	Sections	BAFB EIS	D	0.2857	I
P66	Sections	BAFB EIS	H	-0.1250	I
P66	Sections	BAFB EIS	C	-0.1429	I
P66	Sections	BAFB EIS	A	-0.2500	I
P66	Sections	BAFB EIS	B	-0.2500	I
P67	EISs	P&N Section	F	0.6250	I
P67	EISs	P&N Section	E	0.4286	I
P67	EISs	P&N Section	D	0.3750	I
P67	EISs	P&N Section	H	0.2500	I
P67	EISs	P&N Section	C	0.1667	I
P67	EISs	P&N Section	G	0.1250	I
P67	EISs	P&N Section	B	0.0000	I
P67	EISs	P&N Section	A	-0.1429	I
P68	EISs	EE Section	E	0.8750	I
P68	EISs	EE Section	D	0.8333	I
P68	EISs	EE Section	F	0.7143	I
P68	EISs	EE Section	C	0.6250	I
P68	EISs	EE Section	B	0.5714	I
P68	EISs	EE Section	G	0.5000	I
P68	EISs	EE Section	H	0.5000	I
P68	EISs	EE Section	A	0.2500	I
P69	EIS Sections	All Combinations	F	0.8000	I
P69	EIS Sections	All Combinations	A	0.6667	I
P69	EIS Sections	All Combinations	C	0.6429	I
P69	EIS Sections	All Combinations	D	0.6429	I
P69	EIS Sections	All Combinations	G	0.6250	I
P69	EIS Sections	All Combinations	H	0.6250	I
P69	EIS Sections	All Combinations	E	0.6000	I
P69	EIS Sections	All Combinations	B	0.4667	I
There are no significant pairwise differences among the means.					

Again, for every preference question examined there were no significant pairwise differences between the means of the subjects' responses with respect to the versions read. Stated otherwise, there was no statistically significant difference in the subjects' preferences of one section over another within a particular EIS, of one EIS over another within a particular section, or of any particular EIS/section combination over any other combination, irrespective of version. More succinctly, the subjects had no preferences between the documents they read, regardless of whether or not any of the discourse elements in the document were cohesive.

VI. Conclusions and Recommendations

This chapter has three objectives. First, it will draw conclusions about the results of data analysis in terms of the hypotheses. Second, it will attempt to explain why the results appear to be unsupported by the theory behind the hypotheses. Third, it will outline recommendations for further research.

Conclusions With Respect to the Hypotheses

Hypothesis #1: Coherent documents are cohesive.

On page 1 of Chapter 1, the reader was introduced to this hypothesis which was posed as a question:

Are coherence measurements, such as subjects' Likert scale responses to statements regarding coherence, relation, manner, quality, and quantity, related to the presence or absence of cohesive discourse elements, such as typography, white space, tense, and syntax?

This question was divided into smaller sub-questions which were then assessed through experimentation. These sub-questions, and the conclusions that were drawn as a result of the experiment, are shown below:

a. *Are perceptions of coherence (comprehensibility or readability of a discourse)* ***related to*** *the presence or absence of cohesive discourse elements?*

   No. There was no statistical significance between the subject's preferences or responses to the *coherence* questions with respect to the different EIS versions reviewed. The reader is referred to the ANOVA results beginning on page 159 of Appendix D and to the Tukey Pairwise Comparison of Means summary in Table 11 on page 49.

b. *Are perceptions of relation (relevance or relatedness of information)* ***related to*** *the presence or absence of cohesive discourse elements?*

   No. There was no statistical significance between the subject's preferences or responses to the *relation* questions with respect to the different EIS versions reviewed. Again, the reader is referred to the ANOVA results beginning on page 159 of Appendix D and to the Tukey Pairwise Comparison of Means summary in Table 11 on page 49.

c. *Are perceptions of manner (clarity of information)* ***related to*** *the presence or absence of cohesive discourse elements?*

No. There was no statistical significance between the subject's preferences or responses to the *manner* questions with respect to the different EIS versions reviewed. Again, the reader is referred to the ANOVA results beginning on page 159 of Appendix D and to the Tukey Pairwise Comparison of Means summary in Table 11 on page 49.

d. *Are perceptions of quality (truth or accuracy of the information)* ***related to*** *the presence or absence of cohesive discourse elements?*

No. There was no statistical significance between the subject's preferences or responses to the *quality* questions with respect to the different EIS versions reviewed. Again, the reader is referred to the ANOVA results beginning on page 159 of Appendix D and to the Tukey Pairwise Comparison of Means summary in Table 11 on page 49.

e. *Are perceptions of quantity (amount of information)* ***related to*** *the presence or absence of cohesive discourse elements?*

As noted in on page 45 in Chapter 5, it was not possible to summate the quality construct; therefore, no further analysis was performed.

f. *Are perceptions of coherence* ***correlated with*** *perceptions of relation, manner, quality, and quantity?*

Mostly. The amount of correlation between these constructs was relatively strong in most cases; however, the strength of correlation between the quality construct and the other constructs was less significant. The reader is referred to Table 10 on page 47, and Figure 9 on page 48.

The first hypothesis in this thesis can, therefore, not be accepted as true based upon the experimental evidence. There is no statistically significant difference between subjects' Likert scale responses to statements regarding the experimental constructs of coherence, manner, quality, and relation, with respect to the eight different EIS versions tested.

The second hypothesis can now be considered.

Hypothesis #2: Usable documents are cohesive.

Like the first hypothesis, the second hypothesis was posed as a question:

Are usability measurements, such as subjects' Likert scale responses to statements regarding usability, related to the presence or absence of cohesive discourse elements, such as typography, white space, tense, and syntax?

This question was divided into two sub-questions which were then assessed through experimentation. These sub-questions, and the conclusions that were drawn as a result of the experiment, are shown below:

a. *Are perceptions of usability (ease of comprehending or withdrawing information from the discourse) **related to** the presence or absence of cohesive discourse elements?*

   No. There was no statistical significance between the subject's preferences or responses to the *usability* questions with respect to the different EIS versions reviewed. The reader is referred to the ANOVA results beginning on page 159 of Appendix D and to the Tukey Pairwise Comparison of Means summary in Table 11 on page 49.

b. *Are perceptions of usability **correlated with** perceptions of coherence?*

   Yes. The reader is referred to Table 10 on page 47. usability and coherence were strongly correlated for Versions A, E, F, and G; and moderately correlated with Version D. Summation and analysis of the coherence construct for Versions B and C were not possible due to low Coefficient Alpha scores, as shown in Figure 7 on page 44.

The second hypothesis in this thesis can, therefore, not be accepted as true based upon the experimental evidence. There is no statistically significant difference between subjects' Likert scale responses to statements regarding the experimental construct of usability, with respect to the eight different versions tested.

Discussion of Anomalous Results

In spite of the body of knowledge preceding this research which would predict detectable differences in subjects' perceptions of usability, no statistical significance could be observed between or among the various treatments of discourse elements. This is not entirely surprising, however, since Easterly obtained the essentially the same results with the objective data from this experiment (1994). The question arises, then, as to why these results were obtained. Several factors present themselves as possible contributors, including subject selection, experiment design, and complexity of underlying theory.

Subject Selection

The fact that most subjects had at least a bachelor's degree, were mature, and were familiar with technical and scientific terms could have influenced their perception of the sample EISs. They may have been able to 'see past' the structural errors and judge the documents coherent in spite of a lack of cohesion cues. As Anderson and Davison pointed out, 'interestingness' and depth of the reader's background knowledge may be more significant contributors to readability than such prosaic indicators as sentence length and word count (1988). Indeed, cohesion theory emphasizes that both cohesion and coherence are psychological phenomena, and cohesion is only partly manifested in a physical fashion. There may have been enough cohesive cues present in the documents [even in Version H (- all)] to allow the well-educated and interested subjects to create enough implicature for the documents to appear coherent to them.

Experiment Design

Sample Size

The number of subjects that participated in the experiment may have been inadequate for detecting subtle differences between versions. This assertion is supported by the extremely low values for Power of the *F*-Test that were obtained in Appendix E. Table 13 below shows a summary of the power calculations.

Table 13

***F*-Test Power Calculation Summary**

Construct/Preference	Noncentrality Parameter ϕ	Power = $(1-\beta)$
Coherence	0.3633	P <0.50
Usability	0.3097	P <0.50
Manner	0.4554	P <0.50
Relation	0.5531	P <0.50
Quality	0.5242	P <0.50
P65	1.1122	0.56
P66	0.9659	P <0.50
P67	0.6435	P <0.50
P68	0.5777	P <0.50
P69	0.3257	P <0.50

In almost every case, Table 13 indicates there is less than a 0.50 probability that the alternate hypothesis (that there *is* a statistically significant difference in the ratings) could have correctly been accepted.

Block Design

The structure of the experiment, discussed in the *Methodology* chapter, may have influenced the results. Easterly summarized the problem in the conclusion to her thesis:

> [T]he impact of formulating an incomplete subject data set were not apparent. It appears, however, that this oversight may have confounded our results by not giving us a complete data set to analyze. As we have noted previously, each subject only received 4 of 8 possible Versions. In order to properly analyze data sets, the data must be collected in a specific balanced manner, which varies according to the number of treatments. In the case of this study, the data was not collected in the balanced manner that would lend itself to an appropriate application of statistics, like ANOVA. (Easterly, 1994: 42-43)

Factor Level Selection

The amount of difference in the factor levels was somewhat qualitative and arbitrary. How much were the discourse elements 'messed up' in order to declare them non-cohesive? Are there different levels of 'cohesiveness'? For example, could one treatment of white space be *somewhat* non-cohesive, while another treatment of white space be *extremely* non-cohesive?

Test Instrument Design

The way in which the survey statements were written had some effect; particularly the statements written for the quantity construct. Since it was impossible to summate the ratings for the quantity construct, it was impossible to correlate and compare the *amount* of information to the *usability* of the document.

Complexity Of Underlying Theory

As Easterly pointed out in the conclusion of her thesis, "The underlying theory and experimental design made this research very difficult to conceive and to plan. Because of these factors, this effort was constructed as a pilot study, to test out hypotheses while making observations for future experimental work" (1994: 41). Since this was indeed a pilot study, several recommendations for further research are made in the following section.

Recommendations For Further Research

Subject Selection

The subjects used for this experiment were obtained out of convenience; however, a more appropriate pool of subjects should be located for further testing. Researchers should strive to find subjects who more

closely represent the type of people for whom the CEQ modeled their readability requirements: decision makers and lay persons.

Experiment Design

One way to increase the power of a test like the one performed in this study would be to increase the sample size. It is exceedingly difficult, given the data obtained, to specifically recommend an appropriate sample size; however, it would be safe to assume that doubling the sample size would increase the power of the test, perhaps within acceptable limits. Also, researchers should strive to apply principles of good, balanced experiment design. Several sources (Neter and others, 1990; Keppel, 1991; Devore, 1991) describe good design practice for setting up randomized block experiments.

Multivariate ANOVA (MANOVA) and factor analysis are tools that could be applied to this research if the dimension of cohesion were explored more fully. For example, if a *quantitative* method for creating the different factor levels could be incorporated into the experimental design, it may be possible to perform MANOVA and factor analysis to assess the effect of cohesive discourse elements on another dimension: *amount* of cohesion, rather than simply the presence or absence of cohesive cues.

Test Instrument

One of the positive results of this study was a partial validation of the test instrument. The statement items for the quantity construct would have to be rewritten in order for the construct to attain internal consistency reliability; however, this could be accomplished by using an *evaluation* item, rather than an *agreement* item (Spector, 1992: 23). Instead of asking the subject for a level of agreement with a statement such as "There was too much information in the document", the researcher could phrase the statement "The amount of information in the document was..." and ask the subject to respond on a continuum from "nonexistent" to "excessive". Spector recommends that many different item stems be prepared and a pilot test be accomplished in order to 'weed out' items stems which do not reliably achieve their purpose. He provides much advice on the construction of summated rating scales in his 1992 monograph, and recommends several other sources of information.

References

Alciere, Rose Mary. "Avoiding Governmentspeak," Technical Communication, 40(2): 262-264 (1993).

Anderson, Richard C., and Alice Davison. "Conceptual and Empirical Bases of Readability Formulas." in *Linguistic Complexity and Text Comprehension: Readability Issues Reconsidered.* Eds. Davison, Alice and Georgia M. Green. Hillsdale, New Jersey: Lawrence Erlbaum Associates, Publishers, 1988.

Axline, Michael and John Bonine. "Plain Talk: Making NEPA Work," Land and Water Law Review, 25(1): 61-75 (1990).

Baird, R.N., A.T. Turnbull, and D. McDonald. *The Graphics of Communication: Typography, Layout, Design, Production.* New York, NY: Holt, Rinehart, and Winston, 1987.

Baker, Eva L., Nancy K. Atwood, and Thomas M. Duffy. "Cognitive Approaches to Assessing the Readability of Text." in Linguistic Complexity and Text Comprehension: Readability Issues Reconsidered. Eds. Davison, Alice and Georgia M. Green. Hillsdale, New Jersey: Lawrence Erlbaum Associates, Publishers, 1988.

Blaug, Elisabeth A. "Use of the Environmental Assessment by Federal Agencies in NEPA Implementation," *The Environmental Professional*, 15: 57-65 (1993).

Bregman, Jacob I., and Kenneth M. Mackenthun. *Environmental Impact Statements.* Boca Raton, LA: Lewis Publishers, 1992.

Campbell, Kim Sydow. *Coherence, Continuity, and Cohesion: Theoretical Foundations for Document Design.* Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers, 1995.

Council on Environmental Quality (CEQ). *Regulations For Implementing The Procedural Provisions Of The National Environmental Policy Act.* 40 CFR §1500-1508. Washington: GPO, 1 July 1986.

Department of the Air Force (DAF). *Final Environmental Impact Statement -- Disposal and Reuse of Bergstrom Air Force Base, Texas.* Unpublished Report, United States Air Force, 1993.

Department of the Air Force. *Environmental Impact Analysis Process (EIAP).* AFR 19-2. Washington: HQ USAF, 10 August 1982.

Devore, Jay L. *Probability and Statistics for Engineering and the Sciences* (Third Edition). Belmont, CA: Duxbury Press, 1991.

Easterly, Jill A. *Coherence and Usability of an Environmental Impact Statement.* MS thesis, AFIT/GEE/ENV/94S-07. School of Engineering, Air Force Institute of Technology (AU), Wright-Patterson AFB OH, September 1994.

Elkind, David. *Psychology.* Compton's Interactive Encyclopedia, Compton's NewMedia, Inc. 1994.

Felker, D.B., F. Pickering, V.R. Charrow, V.M. Holland, and J.C. Reddish. *Guidelines for Document Designers.* Washington, DC: Document Design Center, American Institutes for Research, 1981.

Gallagher, Thomas J. and Kent Patrick-Riley. "The Readability of Federal Land Management Plans," *Environmental Management*, 13(1): 85-90 (1989).

Gallagher, Thomas J. and Wendy S. Jacobson. "The Typography of Environmental Impact Statements: Criteria, Evaluation, and Public Participation," *Environmental Management*, 17(1): 99-109 (1993).

Gibbons, Jean Dickinson. *Nonparametric Methods for Quantitative Analysis.* New York, NY: Maple Press, 1976.

Groff, Vern. *The Power of Color in Design for Desktop Publishing.* Portland, OR: Management Information Source, Inc., 1990.

Guillemette, R.A. "Usability In Computer Documentation Design: Conceptual and Methodological Considerations," *IEEE Transactions on Professional Communication*, 32 (4): 217-229 (1989).

Hanna, Jim. "Test STC's Readability," *Technical Communication*, 41(3): 555-561 (1994).

Hartley, J. *Designing Instructional Text.* New York, NY: Nichols Publishing, 1985.

Horning, Alice S. *The Pycholinguistics of Readable Writing: A Multidisciplinary Approach.* Norwood, New Jersey: Ablex Publishing Corporation, 1993.

Jain, R.K., L.V. Urban, G.S. Stacey, and H.E. Balbach. *Environmental Assessment.* New York, NY: McGraw Hill, Inc., 1993.

Keppel, Geoffrey. *Design and Analysis: A Researcher's Handbook.* Englewood Cliffs, NJ: Prentice-Hall, Inc., 1991.

Keyes, Elizabeth. "Typography, Color, and Information Structure," *Technical Communication*, 40(4): 638-654 (1993).

Klare, G.R. *The Measurement of Readability.* Ames, Iowa: Iowa State University Press, 1963.

Microsoft Excel. Spreadsheet. Version 5.0, IBM PC. Computer software. Microsoft Corporation, Redmond WA, 1993.

Miller, J.R., and W. Kintsch. "Readability and recall of short prose passages: A theoretical analysis," *Journal of Experimental Psychology: Human Learning and Memory*, 6: 335-354 (1980).

Neter, John; William Wasserman, and Michael H. Kutner. *Applied Linear Statistical Models, 3rd edition.* Burr Ridge, IL: Richard D. Irwin, Inc., 1990.

Parish, Peggy and Lynn Sweat. *Merry Christmas, Amelia Bedelia.* New York, NY: Avon Books, a division of The Hearst Corporation, 1986.

Parker, Frank, and Kathryn Louise Riley. *Linguistics for Non-Linguists: A Primer With Exercises.* Second Edition. Needham Heights, MA: Allyn and Bacon, 1994.

Robinson, D.O., M. Abbamonte, and S. Evans. "Why Serifs Are Important: The Perception of Small Print," *Visible Language*, 5: 353-359 (1971).

Spector, Paul E. *Summated Rating Scale Construction: An Introduction.* Newberry Park, CA: Sage Publications, Inc., 1992

Statistix. Statistical analysis software. Version 4.1, IBM PC. Computer software. Analytical Software, Tallahassee FL, 1994.

The SAS System. Statistical analysis software. Proprietary Software Release 6.08, VAX Model 6000-420 Mainframe. Computer software. SAS Institute Inc., Cary NC, 1989.

Tinker, M.A. *Bases for Effective Reading*. Minneapolis, MN: University of Minnesota Press, 1965.

United States Army Corps of Engineers (USA COE). *Draft Environmental Impact Statement -- Delaware River Comprehensive Navigation Study*. Unpublished Draft, 1990.

United States Congress. *National Environmental Policy Act of 1969*. Public Law No. 190, 91st Congress. 42 USC §4321-4347. Washington: GPO, 1970.

Weiss, Edmond H. "An Unreadable EIS is an Environmental Hazard," *The Environmental Professional*, 11(3): 236-240 (1989).

Wertheimer, Max. "Gestalt Theory," in *A Source Book of Gestalt Psychology*. Ed. Willis D. Ellis. New York, NY: Harcourt, 1938.

Appendix A: Surveys

General Description: This appendix contains copies of the five surveys which were distributed to the experiment participants. They are described below and appear in their entirety on succeeding pages.

Survey 1: (Questions 1-16) The subjects answered the questions on this survey after they had read the Purpose and Need section of the Delaware River Project EIS. Questions 1-16 are identical to questions 17-32, 33-48, and 49-64.

Survey 2: (Questions 17-32) The subjects answered the questions on this survey after they had read the Environmental Effects section of the Delaware River Project EIS. Questions 17-32 are identical to questions 1-16, 33-48, and 49-64.

Survey 3: (Questions 33-48) The subjects answered the questions on this survey after they had read the Purpose and Need section of the Bergstrom Air Force Base Closure EIS. Questions 33-48 are identical to questions 1-16, 17-32, and 49-64.

Survey 4: (Questions 49-64) The subjects answered the questions on this survey after they had read the Environmental Effects section of the Bergstrom Air Force Base Closure EIS. Questions 49-64 are identical to questions 1-16, 17-32, and 33-48.

Survey 5: (Questions 65-73) After completing the fourth survey, the subjects were given a final survey in which they ranked their preferences in terms of:

- one section over another (P&N vs. EE) for each EIS,
- one EIS over another (DRP vs. BAFB) for each section, and
- one combination over another (BAFB EE vs. BAFB P&N vs. DRP EE vs. DRP P&N).

Also, this survey contains four demographic statements.

Instructions: Please choose one of the five possible answers for each of the following statements. Record your answer by filling in the appropriate space on the machine-scored response sheets provided. (The lettered spaces on that sheet correspond to the responses in the scale below.)
Work at a steady, rapid pace. Do not return to previous responses.

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
A	**B**	**C**	**D**	**E**

1. I easily answered the questions I was given by using this section of the EIS.
2. The author made this section of the EIS understandable.
3. I understood this section of the EIS .
4. I could see the relationships between all the pieces of information in this section of the EIS.
5. The author made this section of the EIS easy to use in answering the questions I was given.
6. The purpose of this section of the EIS was clear.
7. The author made this section of the EIS complete.
8. This section of the EIS was accurate.
9. The author made it easy to see the relationships between all the pieces of information in this section of the EIS.
10. This section of the EIS gave too much information.
11. The author made sure all of the information in this section of the EIS was clearly related.
12. The meaning of this section of the EIS was clear.
13. This section of the EIS gave too little information.
14. The author made this section of the EIS accurate.
15. The information in this section of the EIS was well supported.
16. The author made this section of the EIS clear.

*The subjects answered the questions on this survey after they had read the **Purpose and Need** section of the **Delaware River Project** EIS. Questions 1-16 are identical to questions 17-32, 33-48, and 49-64.*

Instructions: Please choose one of the five possible answers for each of the following statements. Record your answer by filling in the appropriate space on the machine-scored response sheets provided. (The lettered spaces on that sheet correspond to the responses in the scale below.)
Work at a steady, rapid pace. Do not return to previous responses.

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
A	**B**	**C**	**D**	**E**

17. I easily answered the questions I was given by using this section of the EIS.
18. The author made this section of the EIS understandable.
19. I understood this section of the EIS .
20. I could see the relationships between all the pieces of information in this section of the EIS.
21. The author made this section of the EIS easy to use in answering the questions I was given.
22. The purpose of this section of the EIS was clear.
23. The author made this section of the EIS complete.
24. This section of the EIS was accurate.
25. The author made it easy to see the relationships between all the pieces of information in this section of the EIS.
26. This section of the EIS gave too much information.
27. The author made sure all of the information in this section of the EIS was clearly related.
28. The meaning of this section of the EIS was clear.
29. This section of the EIS gave too little information.
30. The author made this section of the EIS accurate.
31. The information in this section of the EIS was well supported.
32. The author made this section of the EIS clear.

*The subjects answered the questions on this survey after they had read the **Environmental Effects** section of the **Delaware River Project** EIS. Questions 17-32 are identical to questions 1-16, 33-48, and 49-64.*

Instructions: Please choose one of the five possible answers for each of the following statements. Record your answer by filling in the appropriate space on the machine-scored response sheets provided. (The lettered spaces on that sheet correspond to the responses in the scale below.)
Work at a steady, rapid pace. Do not return to previous responses.

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
A	**B**	**C**	**D**	**E**

33. I easily answered the questions I was given by using this section of the EIS.
34. The author made this section of the EIS understandable.
35. I understood this section of the EIS .
36. I could see the relationships between all the pieces of information in this section of the EIS.
37. The author made this section of the EIS easy to use in answering the questions I was given.
38. The purpose of this section of the EIS was clear.
39. The author made this section of the EIS complete.
40. This section of the EIS was accurate.
41. The author made it easy to see the relationships between all the pieces of information in this section of the EIS.
42. This section of the EIS gave too much information.
43. The author made sure all of the information in this section of the EIS was clearly related.
44. The meaning of this section of the EIS was clear.
45. This section of the EIS gave too little information.
46. The author made this section of the EIS accurate.
47. The information in this section of the EIS was well supported.
48. The author made this section of the EIS clear.

*The subjects answered the questions on this survey after they had read the **Purpose and Need** section of the **Bergstrom Air Force Base Closure** EIS. Questions 33-48 are identical to questions 1-16, 17-32, and 49-64.*

Instructions: Please choose one of the five possible answers for each of the following statements. Record your answer by filling in the appropriate space on the machine-scored response sheets provided. (The lettered spaces on that sheet correspond to the responses in the scale below.)
Work at a steady, rapid pace. Do not return to previous responses.

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
A	**B**	**C**	**D**	**E**

49. I easily answered the questions I was given by using this section of the EIS.
50. The author made this section of the EIS understandable.
51. I understood this section of the EIS .
52. I could see the relationships between all the pieces of information in this section of the EIS.
53. The author made this section of the EIS easy to use in answering the questions I was given.
54. The purpose of this section of the EIS was clear.
55. The author made this section of the EIS complete.
56. This section of the EIS was accurate.
57. The author made it easy to see the relationships between all the pieces of information in this section of the EIS.
58. This section of the EIS gave too much information.
59. The author made sure all of the information in this section of the EIS was clearly related.
60. The meaning of this section of the EIS was clear.
61. This section of the EIS gave too little information.
62. The author made this section of the EIS accurate.
63. The information in this section of the EIS was well supported.
64. The author made this section of the EIS clear.

*The subjects answered the questions on this survey after they had read the **Environmental Effects** section of the **Bergstrom Air Force Base Closure** EIS. Questions 49-64 are identical to questions 1-16, 17-32, and 33-48.*

Instructions: Please answer the following questions by marking the appropriate spaces on your machine-scored sheet.

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
A	**B**	**C**	**D**	**E**

65. I preferred one section of the EIS concerning the Delaware River project over the other.
66. I preferred one section of the EIS concerning the Bergstrom AFB closing over the other.
67. I preferred one *Purpose & Need* section over the one from the other EIS.
68. I preferred one *Environmental Effects* section over the one from the other EIS.
69. I preferred one of the four EIS sections I read today over any of the others.

70. Your age is
    a. 25 years or less
    b. 26 through 35 years
    c. 36 through 45 years
    d. 46 through 55 years
    e. 56 years or more

71. Your highest educational level obtained is
    a. high school diploma or GED
    b. some college
    c. Bachelor's degree
    d. some graduate school
    e. graduate degree (Master's or Ph.D.)

72. Your gender is
    a. female
    b. male

73. You are
    a. U.S. military officer
    b. U.S. enlisted
    c. civilian (GS level 10 or above)
    d. civilian (GS level 1 through 9)
    e. other

THANK YOU FOR YOUR PARTICIPATION!!

Appendix B: Excel Database

General Description: This appendix contains a compilation of the raw data collected during the experiment. The subject number and group number are shown on each page in order to give the reader a reference. The pages are divided into the six constructs, as well as preference and demographic questions. A summary of the responses for each subject is shown on the last page.

			Coherence							
		Basic	2	2	2	2	3	3	3	3
Subject	Group	Construct	C	C	C	C	C	C	C	C
Number	Number	Item	2	18	34	50	3	19	35	51
1	1		E	B	D	D	E	B	D	D
9	1		B	C	D	D	B	D	D	D
17	1		A	B	D	D	D	D	D	D
25	1									
2	2		B	D	D	D	B	D	D	D
10	2		C	C	D	D	C	B	D	D
18	2		D	B	E	D	D	D	D	D
26	2		A	B	D	A	D	A	D	B
3	3		D	D	D	B	D	D	D	D
11	3		D	B	B	D	D	B	B	D
19	3									
27	3		B	B	D	D	D	B	D	D
4	4		A	B	D	C	C	D	D	D
12	4		E	D	E	E	E	D	E	E
20	4		B	C	C	B	C	D	D	B
28	4		B	B	D	D	B	B	D	D
5	5		C	B	D	E	E	D	D	D
13	5		B	B	D	D	C	B	D	D
21	5		C	B	D	B	D	C	D	C
29	5		B	B	D	D	D	A	D	D
6	6		D	B	E	D	D	B	E	D
14	6		D	B	C	D	C	B	D	D
22	6		C	A	D	D	D	C	D	D
30	6		B	C	C	C	B	D	C	D
7	7		D	B	D	C	D	C	D	D
15	7		C	C	D	D	D	D	D	D
23	7		E	E	E	E	E	E	E	E
31	7		D	B	E	D	D	C	D	D
8	8		C	C	D	D	C	C	C	C
16	8		B	B	D	B	D	D	D	D
24	8		B	B	C	B	C	D	D	D
32	8		B	A	E	E	C	A	E	E
		A	3	2	0	1	0	3	0	0
		B	11	18	1	5	4	8	1	2
		C	6	6	4	3	8	5	2	2
		D	7	3	19	17	14	13	23	23
		E	3	1	6	4	4	1	4	3
		Total:	30	30	30	30	30	30	30	30

			Quality											
		Basic	8	8	8	8	14	14	14	14	15	15	15	15
Subject	Group	Construct	L	L	L	L	L	L	L	L	L	L	L	L
Number	Number	Item	8	24	40	56	14	30	46	62	15	31	47	63
1	1		C	C	C	C	E	C	C	C	D	B	D	D
9	1		C	C	C	C	C	C	C	C	C	C	C	C
17	1		C	C	C	C	C	C	C	D	C	B	B	D
25	1													
2	2		C	C	C	C	C	C	C	C	B	C	C	C
10	2		C	C	C	C	C	C	C	C	C	D	D	D
18	2		C	C	C	C	C	C	C	C	D	D	B	B
26	2		C	C	C	C	C	C	C	C	B	C	C	D
3	3		C	C	C	C	C	C	D	C	D	B	D	B
11	3		C	C	C	D	D	C	C	C	D	D	B	D
19	3													
27	3		C	C	C	C	C	C	C	C	C	C	C	C
4	4		B	C	D	C	C	D	D	B	B	D	D	C
12	4		D	E	E	D	D	D	D	D	D	D	E	D
20	4		D	D	D	D	D	D	D	D	D	D	D	D
28	4		C	C	C	C	C	C	C	C	C	D	D	D
5	5		C	C	C	C	C	C	C	C	C	B	C	C
13	5		B	C	C	C	B	C	C	C	B	D	D	C
21	5		C	C	C	C	C	C	C	C	C	C	D	C
29	5		C	C	C	C	C	C	C	C	C	C	C	C
6	6		C	C	C	C	C	C	C	C	B	D	D	B
14	6		C	B	C	C	C	B	C	C	C	C	D	D
22	6		C	C	C	C	C	B	C	C	C	B	C	C
30	6		C	C	C	C	C	C	C	C	C	C	C	C
7	7		C	C	D	C	C	C	D	C	C	D	D	C
15	7		C	C	D	D	C	C	D	D	C	C	D	D
23	7		E	E	E	E	E	E	E	E	E	E	E	E
31	7		C	C	D	D	C	C	D	C	C	C	D	C
8	8		C	C	D	D	C	C	D	D	C	C	D	D
16	8		D	C	C	B	C	C	C	C	C	C	C	C
24	8		B	C	C	B	C	C	B	B	A	B	A	B
32	8		D	C	C	C	C	C	C	C	B	C	C	C
		A	0	0	0	0	0	0	0	0	1	0	1	0
		B	3	1	0	2	1	2	1	2	6	6	3	4
		C	22	26	22	21	24	24	20	22	16	13	10	14
		D	4	1	6	6	3	3	8	5	6	10	14	11
		E	1	2	2	1	2	1	1	1	1	1	2	1
		Total:	30	30	30	30	30	30	30	30	30	30	30	30

			Manner											
		Basic	6	6	6	6	12	12	12	12	16	16	16	16
Subject	Group	Construct	M	M	M	M	M	M	M	M	M	M	M	M
Number	Number	Item	6	22	38	54	12	28	44	60	16	32	48	64
1	1		E	B	D	D	D	B	D	D	E	B	D	D
9	1		A	D	D	D	B	C	D	D	A	D	D	D
17	1		B	B	D	D	B	B	D	D	B	B	D	D
25	1													
2	2		B	C	D	E	B	D	D	D	B	D	D	D
10	2		D	D	E	D	C	C	D	D	D	C	D	E
18	2		D	D	D	D	D	B	D	D	D	B	D	D
26	2		C	B	B	B	A	A	B	C	A	A	B	B
3	3		D	D	D	D	D	D	C	D	D	D	D	D
11	3		B	B	B	E	C	C	B	D	B	B	B	E
19	3													
27	3		B	B	D	D	B	B	D	D	B	B	D	D
4	4		B	E	C	D	B	B	C	D	A	B	D	C
12	4		D	D	E	D	D	C	E	E	D	D	D	E
20	4		C	B	B	D	B	B	D	B	B	B	B	B
28	4		B	B	D	D	B	B	D	D	B	B	D	D
5	5		D	D	D	D	D	B	D	D	D	C	D	D
13	5		B	D	D	D	C	C	C	D	B	C	D	D
21	5		C	C	D	B	C	B	D	B	B	C	D	B
29	5		B	B	D	D	B	B	D	D	B	B	D	D
6	6		C	B	E	D	C	B	E	D	D	B	E	D
14	6		C	B	C	D	C	B	C	D	C	B	D	D
22	6		B	C	B	D	B	B	B	B	B	B	B	C
30	6		B	C	C	D	B	C	D	C	B	C	C	C
7	7		D	D	E	C	D	C	D	D	D	C	D	C
15	7		C	B	D	D	C	B	D	D	B	C	D	D
23	7		E	E	E	E	E	E	E	E	E	E	E	E
31	7		E	D	E	D	D	B	D	D	D	A	E	D
8	8		C	C	D	C	C	C	D	D	C	C	D	D
16	8		C	C	D	D	C	D	D	D	C	B	D	D
24	8		C	B	B	B	B	B	B	C	B	C	B	B
32	8		B	A	E	E	B	B	E	E	B	A	E	E
		A	1	1	0	0	1	1	0	0	3	3	0	0
		B	11	12	5	3	12	17	4	3	14	13	5	4
		C	9	6	3	2	9	8	4	3	3	9	1	4
		D	6	9	15	21	7	3	18	21	8	4	20	17
		E	3	2	7	4	1	1	4	3	2	1	4	5
		Total:	30	30	30	30	30	30	30	30	30	30	30	30

			Relation											
		Basic	4	4	4	4	9	9	9	9	11	11	11	11
Subject	Group	Construct	R	R	R	R	R	R	R	R	R	R	R	R
Number	Number	Item	4	20	36	52	9	25	41	57	11	27	43	59
1	1		E	A	D	D	D	B	D	D	D	B	D	D
9	1		A	C	D	D	A	B	D	D	A	C	D	C
17	1		D	B	D	D	B	B	D	D	B	B	D	D
25	1													
2	2		B	B	D	D	B	C	D	D	B	C	D	D
10	2		B	A	E	E	D	B	D	E	C	B	D	E
18	2		D	B	D	D	B	B	B	D	B	B	B	B
26	2		A	A	C	C	A	A	B	B	B	C	C	C
3	3		D	D	D	D	D	D	D	C	D	D	C	D
11	3		D	D	A	D	B	D	A	D	B	B	A	D
19	3													
27	3		D	B	D	D	B	B	D	D	B	B	D	D
4	4		B	C	D	C	A	B	D	C	B	B	D	C
12	4		D	D	D	E	D	D	D	D	D	D	D	D
20	4		C	B	C	B	B	B	B	B	C	B	C	C
28	4		B	B	D	D	B	B	D	D	B	B	D	D
5	5		D	B	D	D	D	B	D	D	C	A	D	D
13	5		B	C	C	D	A	C	C	D	A	C	C	C
21	5		B	B	D	B	B	B	D	B	B	B	D	B
29	5		B	B	D	D	B	B	D	D	B	B	D	D
6	6		C	D	E	D	D	D	D	D	D	D	D	D
14	6		C	A	D	D	C	B	C	D	C	B	C	D
22	6		C	B	C	C	C	B	C	C	C	B	B	C
30	6		B	D	C	D	B	C	C	C	B	B	C	C
7	7		D	C	D	D	D	C	D	C	D	C	D	D
15	7		C	D	D	D	C	C	D	D	B	B	C	D
23	7		E	E	E	E	E	E	E	E	E	E	E	E
31	7		C	C	D	E	D	B	E	D	D	B	D	D
8	8		C	C	D	C	D	C	D	D	C	C	D	D
16	8		D	B	D	D	C	B	C	C	B	C	C	B
24	8		B	C	B	C	A	B	B	B	C	B	B	B
32	8		B	A	E	E	A	A	E	E	B	B	E	E
		A	2	5	1	0	6	2	1	0	2	1	1	0
		B	10	11	1	2	10	17	4	4	14	18	3	4
		C	7	7	5	5	4	6	5	6	7	7	8	7
		D	9	6	19	18	9	4	17	17	6	3	16	16
		E	2	1	4	5	1	1	3	3	1	1	2	3
		Total:	30	30	30	30	30	30	30	30	30	30	30	30

Subject Number	Group Number	Basic Construct Item	Quantity											
			7	7	7	7	10	10	10	10	13	13	13	13
			T	T	T	T	T	T	T	T	T	T	T	T
			7	23	39	55	10	26	42	58	13	29	45	61
1	1		E	B	D	D	B	B	B	B	B	D	B	B
9	1		A	B	D	C	D	D	C	D	B	C	C	C
17	1		D	B	D	D	D	D	B	B	B	B	D	B
25	1													
2	2		C	B	D	C	B	B	C	B	D	C	B	C
10	2		C	C	C	C	B	E	B	B	B	B	B	B
18	2		D	D	D	D	D	E	B	B	B	B	B	B
26	2		A	C	B	C	E	E	C	C	E	C	C	C
3	3		D	D	C	C	B	D	B	C	B	B	E	C
11	3		B	B	B	D	B	D	D	B	B	B	A	B
19	3													
27	3		D	C	C	C	B	B	B	C	B	B	B	C
4	4		C	B	D	C	D	D	C	C	B	C	C	C
12	4		D	D	E	E	C	B	B	B	B	B	E	B
20	4		B	D	C	D	E	E	D	D	B	A	B	B
28	4		B	B	D	C	D	D	B	B	D	B	B	B
5	5		D	A	D	C	B	C	B	C	B	B	B	C
13	5		B	C	C	C	C	D	B	A	D	B	B	C
21	5		B	C	D	C	C	D	B	B	B	B	B	B
29	5		C	C	C	C	B	D	B	C	D	D	B	B
6	6		C	C	C	C	B	C	C	C	D	C	C	C
14	6		D	B	C	D	B	D	B	B	B	B	B	B
22	6		D	B	C	C	D	B	C	C	B	C	C	C
30	6		B	C	C	D	B	D	C	C	C	B	B	C
7	7		D	D	D	D	B	D	B	C	B	B	B	B
15	7		B	B	D	D	D	E	B	B	B	B	B	B
23	7		E	E	E	E	B	B	B	B	B	B	B	B
31	7		B	B	D	E	A	B	A	A	D	C	A	C
8	8		C	D	D	D	D	D	B	C	A	A	B	A
16	8		C	B	B	D	E	D	B	B	A	B	B	B
24	8		B	B	B	B	D	D	B	C	B	B	B	C
32	8		B	A	E	E	C	D	C	C	C	B	C	C
		A	2	2	0	0	1	0	1	2	2	2	2	1
		B	10	13	4	1	13	7	19	13	19	19	19	15
		C	7	8	10	14	4	2	8	13	2	7	6	14
		D	9	6	13	11	9	16	2	2	6	2	1	0
		E	2	1	3	4	3	5	0	0	1	0	2	0
		Total:	30	30	30	30	30	30	30	30	30	30	30	30

			Usability							
		Basic	1	1	1	1	5	5	5	5
Subject	Group	Construct	U	U	U	U	U	U	U	U
Number	Number	Item	1	17	33	49	5	21	37	53
1	1		E	B	D	D	E	B	D	D
9	1		B	C	D	C	B	C	D	C
17	1		B	B	D	D	B	B	D	D
25	1									
2	2		B	B	E	D	B	B	E	E
10	2		D	D	D	D	D	C	D	E
18	2		D	B	D	D	D	B	D	D
26	2		D	D	D	A	A	A	B	A
3	3		E	D	D	B	D	D	C	D
11	3		D	B	D	E	B	B	B	E
19	3									
27	3		B	D	D	D	B	B	D	D
4	4		B	B	C	C	B	B	D	C
12	4		D	D	E	D	D	D	D	E
20	4		B	D	E	B	B	C	C	A
28	4		B	B	D	D	A	B	D	D
5	5		D	B	D	B	D	B	D	B
13	5		C	B	D	D	B	B	D	D
21	5		C	B	D	D	B	C	D	D
29	5		B	A	D	C	B	A	D	D
6	6		D	B	E	D	B	A	E	D
14	6		D	B	C	D	C	B	C	D
22	6		D	B	C	C	B	B	B	B
30	6		C	B	C	C	B	D	C	C
7	7		E	D	E	B	E	C	D	B
15	7		B	C	D	D	B	C	D	D
23	7		E	E	E	E	E	E	E	E
31	7		D	B	E	D	D	B	E	E
8	8		C	A	D	C	C	C	D	C
16	8		D	C	D	B	C	D	D	B
24	8		B	C	C	D	B	C	B	C
32	8		B	A	E	E	B	A	E	E
		A	0	3	0	1	2	4	0	2
		B	11	15	0	5	16	13	4	4
		C	4	4	5	6	3	8	4	5
		D	11	7	17	15	6	4	17	12
		E	4	1	8	3	3	1	5	7
		Total:	30	30	30	30	30	30	30	30

			Preference					*Demographics*			
Subject Number	Group Number	Category / Question	*P 65*	*P 66*	*P 67*	*P 68*	*P 69*	*D 70*	*D 71*	*D 72*	*D 73*
1	1		*C*	*D*	*B*	*C*	*D*	*B*	*E*	*B*	*A*
9	1		*A*	*B*	*A*	*B*	*A*	*C*	*E*	*A*	*C*
17	1		*B*	*B*	*E*	*E*	*D*	*B*	*C*	*A*	*A*
25	1										
2	2		*B*	*C*	*D*	*D*	*C*	*C*	*E*	*B*	*C*
10	2		*C*	*D*	*C*	*D*	*D*	*D*	*E*	*B*	*D*
18	2		*A*	*E*	*A*	*E*	*C*	*A*	*E*	*B*	*A*
26	2		*C*	*C*	*C*	*C*	*C*	*C*	*E*	*A*	*C*
3	3		*D*	*D*	*D*	*D*	*D*	*D*	*B*	*B*	*C*
11	3		*C*	*E*	*C*	*E*	*E*	*B*	*D*	*B*	*C*
19	3										
27	3		*B*	*B*	*D*	*D*	*D*	*C*	*E*	*B*	*A*
4	4		*D*	*D*	*D*	*C*	*C*	*B*	*E*	*B*	*A*
12	4		*D*	*E*	*D*	*E*	*E*	*C*	*E*	*B*	*A*
20	4		*D*	*C*	*D*	*C*	*D*	*B*	*E*	*B*	*C*
28	4		*B*	*D*	*D*	*D*	*D*	*C*	*E*	*A*	*A*
5	5		*D*	*C*	*D*	*D*	*C*	*B*	*E*	*B*	*A*
13	5		*B*	*C*	*D*	*D*	*D*	*B*	*E*	*B*	*A*
21	5		*C*	*A*	*A*	*A*	*A*	*B*	*E*	*A*	*C*
29	5		*D*	*D*	*D*	*D*	*D*	*C*	*B*	*A*	*E*
6	6		*B*	*D*	*D*	*B*	*D*	*C*	*E*	*A*	*C*
14	6		*D*	*C*	*C*	*C*	*D*	*D*	*B*	*A*	*D*
22	6		*E*	*C*	*D*	*D*	*D*	*A*	*A*	*A*	*E*
30	6		*B*	*B*	*B*	*D*	*D*	*C*	*E*	*B*	*A*
7	7		*D*	*C*	*D*	*D*	*D*	*B*	*C*	*A*	*A*
15	7		*D*	*D*	*D*	*D*	*D*	*B*	*E*	*B*	*A*
23	7		*B*	*B*	*B*	*B*	*B*	*A*	*D*	*B*	*A*
31	7		*E*	*A*	*B*	*E*	*D*	*B*	*E*	*B*	*C*
8	8		*B*	*C*	*C*	*B*	*C*	*D*	*B*	*A*	*D*
16	8		*B*	*E*	*C*	*D*	*E*	*B*	*E*	*B*	*A*
24	8		*D*	*B*	*B*	*B*	*C*	*C*	*D*	*B*	*C*
32	8		*B*	*B*	*E*	*E*	*E*	*B*	*E*	*B*	*A*
		A	*2*	*2*	*3*	*1*	*2*	*3*	*1*	*11*	*15*
		B	*11*	*7*	*5*	*5*	*1*	*13*	*4*	*19*	*0*
		C	*5*	*9*	*6*	*5*	*7*	*10*	*2*	*0*	*10*
		D	*10*	*8*	*14*	*13*	*16*	*4*	*3*	*0*	*3*
		E	*2*	*4*	*2*	*6*	*4*	*0*	*20*	*0*	*2*
		Total:	*30*	*30*	*30*	*30*	*30*	*30*	*30*	*30*	*30*

Subject Number	Group Number	Scale Answer	SD A	D B	N C	A D	SA E	
1	1		1	18	7	29	9	
9	1		6	8	26	24	0	
17	1		1	24	8	31	0	
25	1							
2	2		0	19	19	22	4	
10	2		1	11	21	23	8	
18	2		0	21	8	33	2	
26	2		16	14	24	7	3	
3	3		0	8	15	39	2	
11	3		4	27	8	21	4	
19	3							
27	3		0	23	17	24	0	
4	4		3	18	23	19	1	
12	4		0	6	2	37	19	
20	4		2	26	12	21	3	
28	4		1	26	10	27	0	
5	5		2	14	18	28	2	
13	5		3	16	25	20	0	
21	5		0	25	23	16	0	
29	5		3	20	18	23	0	
6	6		1	10	21	24	8	
14	6		1	19	24	20	0	
22	6		1	23	31	9	0	
30	6		0	15	40	9	0	
7	7		0	9	20	31	4	
15	7		0	15	17	31	1	
23	7		0	8	0	0	56	
31	7		5	9	13	27	10	
8	8		4	2	32	26	0	
16	8		1	18	22	22	1	
24	8		3	37	18	6	0	
32	8		10	13	17	2	22	**Total**
			69	502	539	651	159	1,920

A	69	(SD) Strongly Disagree
B	502	(D) Disagree
C	539	(N) Neither Agree nor Disagree
D	651	(A) Agree
E	159	(SA) Strongly Agree
Total	1,920	

Appendix C: *SAS* Statistical Analysis Files

General Description: This appendix contains the *SAS* programs written to analyze the data, as well as their results. It is divided into the different EIS versions, and the constructs and preferences are analyzed within EIS versions. First, the *SAS* program (*.SAS file) for that version is shown, then the analysis is presented (*.LIS file). Second, the analysis is shown in the following order: construct Cronbach Alpha, construct simple statistics, preference Cronbach Alpha, and then preference simple statistics.

The SAS analysis is shown in the following order:

Entire Data Set - Version A through Version H

.SAS Program File

```
TITLE 'Entire Data Set';
OPTIONS LINESIZE=80;
DATA dataset;
   INPUT  SUBJ     1-2   GRP        3   EIS    $ 4-7   SEC    $ 8-9
          VER     $ 10   CUES $ 11-14   TIME   15-18   SCORE  19-20
          USE01   21-22  COH02  23-24   COH03  25-26   REL04  27-28
          USE05   29-30  MAN06  31-32   QTY07  33-34   QLT08  35-36
          REL09   37-38  QTY10  39-40   REL11  41-42   MAN12  43-44
          QTY13   45-46  QLT14  47-48   QLT15  49-50   MAN16  51-52
          P65     53-54  P66    55-56   P67    57-58   P68    59-60
          P69     61-62  D70      63    D71      64    D72      65
          D73       66;
   QTY13R = -1*(QTY13);
CARDS;
 11DRP PNANOWS 526 2 2 2 2 2 2 2 2 0 1-1 1 1-1 2 1 2 0 1-1 0 12521
 11DRP EEBNOTY 812 3-1-1-1-2-1-1-1 0-1-1-1-1 1 0-1-1 0 1-1 0 12521
 11BAFBPNCNOTS 564 6 1 1 1 1 1 1 1 0 1-1 1 1-1 0 1 1 0 1-1 0 12521
 11BAFBEEDNOSY 554 6 1 1 1 1 1 1 1 0 1-1 1 1-1 0 1 1 0 1-1 0 12521
 22DRP PNBNOTY 868 0-1-1-1-1-1-1-1 0 0-1-1-1-1 1 0-1-1-1 0 1 1 03523
 22DRP EECNOTS 654 0-1 1 1-1-1 0-1 0 0-1 0 1 0 0 0 1-1 0 1 1 03523
 22BAFBPNDNOSY 364 4 2 1 1 1 2 1 1 0 1 0 1 1-1 0 0 1-1 0 1 1 03523
 22BAFBEEELING 414 7 1 1 1 1 2 2 0 0 1-1 1 1 0 0 0 1-1 0 1 1 03523
 33DRP PNCNOTS 650 3 2 1 1 1 1 1 1 0 1-1 1 1-1 0 1 1 1 1 1 1 14223
 33DRP EEDNOSY 852 1 1 1 1 1 1 1 1 0 1 1 1 1-1 0-1 1 1 1 1 1 1 14223
 33BAFBPNELING 789 7 1 1 1 1 0 1 0 0 1-1 0 0 2 1 1 1 1 1 1 1 1 14223
 33BAFBEEFVIS  363 1-1-1 1 1 1 1 0 0 0 0 1 1 0 0-1 1 1 1 1 1 1 14223
 44DRP PNDNOSY 846 0-1-2 0-1-1-1 0-1-2 1-1-1-1 0-1-2 1 1 1 0 02521
 44DRP EEELING1061 8-1-1 1 0-1 2-1 0-1 1-1-1 0 1 1-1 1 1 1 0 02521
 44BAFBPNFVIS  626 1 0 1 1 1 1 0 1 1 1 0 1 0 0 1 1 1 1 1 1 0 02521
 44BAFBEEGALL  503 1 0 0 1 0 0 1 0 0 0 0 0 1 0-1 0 0 1 1 1 0 02521
 55DRP PNELING 945 6 1 0 2 1 1 1 1 0 1-1 0 1-1 0 0 1 1 0 1 1 02521
 55DRP EEFVIS  689 0-1-1 1-1-1 1-2 0-1 0-2-1-1 0-1 0 1 0 1 1 02521
 55BAFBPNGALL  407 6 1 1 1 1 1 1 1 0 1-1 1 1-1 0 0 1 1 0 1 1 02521
 55BAFBEEHNONE 591 3-1 2 1 1-1 1 0 0 1 0 1 1 0 0 0 1 1 0 1 1 02521
 66BAFBEEANOWS 549 7 1 1 1 1 1 1 0 0 1 0 1 1 0 0-1 1-1 1 1-1 13513
 66DRP PNFVIS  908 0 1 1 1 0-1 0 0 0 1-1 1 0 1 0-1 1-1 1 1-1 13513
 66DRP EEGALL  955 0-1-1-1 1-2-1 0 0 1 0 1-1 0 0 1-1-1 1 1-1 13513
 66BAFBPNHNONE 850 6 2 2 2 2 2 2 0 0 1 0 1 2 0 0 1 2-1 1 1-1 13513
 77BAFBPNANOWS 987 3 2 1 1 1 1 2 1 1 1-1 1 1-1 1 1 1 1 0 1 1 12311
 77BAFBEEBNOTY 701 3-1 0 1 1-1 0 1 0 0 0 1 1-1 0 0 0 1 0 1 1 12311
 77DRP PNGALL 1080 2 2 1 1 1 2 1 1 0 1-1 1 1-1 0 0 1 1 0 1 1 12311
 77DRP EEHNONE 997 2 1-1 0 0 0 1 1 0 0 1 0 0-1 0 1 0 1 0 1 1 12311
 88DRP EEANOWS1607 1-2 0 0 0 0 0 1 0 0 1 0 0-2 0 0 0-1 0 0-1 04214
 88BAFBPNBNOTY 614 5 1 1 0 1 1 1 1 1 1-1 1 1-1 1 1 1-1 0 0-1 04214
 88BAFBEECNOTS 794 3 0 1 0 0 0 0 1 1 1 0 1 1-2 1 1 1-1 0 0-1 04214
 88DRP PNHNONE1010 0 0 0 0 0 0 0 0 0 0 1 1 0 0-2 0 0 0-1 0 0-1 04214
 91DRP PNANOWS 700 0-1-1-1-2-1-2-2 0-2 1-2-1-1 0 0-2-2-1-2-1-23513
 91DRP EEBNOTY 853 0 0 0 1 0 0 1-1 0-1 1 0 0 0 0 0 1-2-1-2-1-23513
 91BAFBPNCNOTS 705 6 1 1 1 1 1 1 1 0 1 0 1 1 0 0 0 1-2-1-2-1-23513
 91BAFBEEDNOSY 720 6 0 1 1 1 0 1 0 0 1 1 0 1 0 0 0 1-2-1-2-1-23513
102DRP PNBNOTY1183 1 1 0 0-1 1 1 0 0 1-1 0 0-1 0 0 1 0 1 0 1 14524
102DRP EECNOTS1444 0 1 0-1-2 0 1 0 0-1 2-1 0-1 0 1 0 0 1 0 1 14524
102BAFBPNDNOSY 845 8 1 1 1 2 1 2 0 0 1-1 1 1-1 0 1 1 0 1 0 1 14524
```

```
102BAFBEEELING 908 3 1 1 1 2 2 1 0 0 2-1 2 1-1 0 1 2 0 1 0 1 14524
113DRP PNCNOTS1065 2 1 1 1 1-1-1-1 0-1-1-1 0-1 1 1-1 0 2 0 2 22423
113DRP EEDNOSY 996 0-1-1-1 1-1-1-1 0 1 1-1 0-1 0 1-1 0 2 0 2 22423
113BAFBPNELING 891 6 1-1-1-2-1-1-1 0-2 1-2-1-2 0-1-1 0 2 0 2 22423
113BAFBEEFVIS  575 7 2 1 1 1 2 2 1 1 1-1 1 1-1 0 1 2 0 2 0 2 22423
124DRP PNDNOSY1242 0 1 2 2 1 1 1 1 1 1 0 1 1-1 1 1 1 1 2 1 2 23521
124DRP EEELING1347 2 1 1 1 1 1 1 1 2 1-1 1 0-1 1 1 1 1 2 1 2 23521
124BAFBPNFVIS  853 5 2 2 2 1 1 2 2 2 1-1 1 2 2 1 2 1 1 2 1 2 23521
124BAFBEEGALL  685 3 1 2 2 2 2 1 2 1 1-1 1 2-1 1 1 2 1 2 1 2 23521
135DRP PNELING1286 5 0-1 0-1-1-1-1-1-2 0-2 0 1-1-1-1-1 0 1 1 12521
135DRP EEFVIS  914 0-1-1-1 0-1 1 0 0 0 1 0 0-1 0 1 0-1 0 1 1 12521
135BAFBPNGALL  52610 1 1 1 0 1 1 0 0 0-1 0 0-1 0 1 1-1 0 1 1 12521
135BAFBEEHNONE 45410 1 1 1 1 1 1 0 0 1-2 0 1 0 0 0 1-1 0 1 1 12521
146BAFBEEANOWS 745 4 1 1 1 1 1 1 1 0 1-1 1 1-1 0 1 1 1 0 0 0 14214
146DRP PNFVIS 1395 2 1 1 0 0 0 0 1 0 0-1 0 0-1 0 0 0 1 0 0 0 14214
146DRP EEGALL 1098 3-1-1-1-2-1-1-1-1-1 1-1-1-1-1 0-1 1 0 0 0 14214
146BAFBPNHNONE 399 5 0 0 1 1 0 0 0 0 0-1 0 0-1 0 1 1 1 0 0 0 14214
157BAFBPNANOWS 391 6 1 1 1 1 1 1 1 1 1-1 0 1-1 1 1 1 1 1 1 1 12521
157BAFBEEBNOTY 41010 1 1 1 1 1 1 1 1 1-1 1 1-1 1 1 1 1 1 1 1 12521
157DRP PNGALL  755 3-1 0 1 0-1 0-1 0 0 1-1 0-1 0 0-1 1 1 1 1 12521
157DRP EEHNONE 667 3 0 0 1 1 0-1-1 0 0 2-1-1-1 0 0 0 1 1 1 1 12521
168DRP EEANOWS 757 4 0-1 1-1 1 0-1 0-1 1 0 1-1 0 0-1-1 2 0 1 22521
168BAFBPNBNOTY 523 6 1 1 1 1 1 1-1 0 0-1 0 1-1 0 0 1-1 2 0 1 22521
168BAFBEECNOTS 570 2-1-1 1 1-1 1 1-1 0-1-1 1-1 0 0 1-1 2 0 1 22521
168DRP PNHNONE 569 2 1-1 1 1 0 0 0 1 0 2-1 0-2 0 0 0-1 2 0 1 22521
171DRP PNANOWS 726 3-1-2 1 1-1-1 1 0-1 1-1-1-1 0 0-1-1-1 2 2 12311
171DRP EEBNOTY 706 9-1-1 1-1-1-1-1 0-1 1-1-1-1 0-1-1-1-1 2 2 12311
171BAFBPNCNOTS 564 6 1 1 1 1 1 1 1 0 1-1 1 1 1 0-1 1-1-1 2 2 12311
171BAFBEEDNOSY 532 3 1 1 1 1 1 1 1 0 1-1 1 1-1 1 1 1-1-1 2 2 12311
182DRP PNBNOTY 822 0 1 1 1 1 1 1 1 0-1 1-1 1-1 0 1 1-2 2-2 2 01521
182DRP EECNOTS 627 4-1-1 1-1-1 1 1 0-1 2-1-1-1 0 1-1-2 2-2 2 01521
182BAFBPNDNOSY 450 9 1 2 1 1 1 1 1 0-1-1-1 1-1 0-1 1-2 2-2 2 01521
182BAFBEEELING 426 1 1 1 1 1 1 1 1 0 1-1-1 1-1 0-1 1-2 2-2 2 01521
204DRP PNDNOSY1042 2-1-1 0 0-1 0-1 1-1 2 0-1-1 1 1-1 1 0 1 0 12523
204DRP EEELING 677 1 1 0 1-1 0-1 1 1-1 2-1-1-2 1 1-1 1 0 1 0 12523
204BAFBPNFVIS  798 9 2 0 1 0 0-1 0 1-1 1 0 1-1 1 1-1 1 0 1 0 12523
204BAFBEEGALL 1123 3-1-1-1-1-2 1 1 1-1 1 0-1-1 1 1-1 1 0 1 0 12523
215DRP PNELING1105 2 0 0 1-1-1 0-1 0-1 0-1 0-1 0 0-1 0-2-2-2-22513
215DRP EEFVIS 1156 0-1-1 0-1 0 0 0 0-1 1-1-1-1 0 0 0 0-2-2-2-22513
215BAFBPNGALL  801 3 1 1 1 1 1 1 1 0 1-1 1 1-1 0 1 1 0-2-2-2-22513
215BAFBEEHNONE 670 7 1-1 0-1 1-1 0 0-1-1-1-1-1 0 0-1 0-2-2-2-22513
226BAFBEEANOWS 53610 0 1 1 0-1 1 0 0 0 0 0-1 0 0 0 0 2 0 1 1 11115
226DRP PNFVIS 1022 5 1 0 1 0-1-1 1 0 0 1 0-1-1 0 0-1 2 0 1 1 11115
226DRP EEGALL  875 1-1-2 0-1-1 0-1 0-1-1-1-1 0-1-1-1 2 0 1 1 11115
226BAFBPNHNONE1163 3 0 1 1 0-1-1 0 0 0 0-1-1 0 0 0-1 2 0 1 1 11115
237BAFBPNANOWS 658 6 2 2 2 2 2 2 2 2 2-1 2 2-1 2 2 2-1-1-1-1-11421
237BAFBEEBNOTY 441 3 2 2 2 2 2 2 2 2 2-1 2 2-1 2 2 2-1-1-1-1-11421
237DRP PNGALL 1429 2 2 2 2 2 2 2 2 2 2-1 2 2-1 2 2 2-1-1-1-1-11421
237DRP EEHNONE 674 0 2 2 2 2 2 2 2 2 2-1 2 2-1 2 2 2-1-1-1-1-11421
248DRP EEANOWS1199 0 0-1 1 0 0-1-1 0-1 1-1-1-1 0-1 0 1-1-1-1 03423
248BAFBPNBNOTY 326 6 0 0 1-1-1-1-1 0-1-1-1-1-1-1-2-1 1-1-1-1 03423
248BAFBEECNOTS 399 3 1-1 1 0 0-1-1-1-1 0-1 0 0-1-1-1 1-1-1-1 03423
248DRP PNHNONE 863 2-1-1 0-1-1 0-1-1-2 1 0-1-1 0-2-1 1-1-1-1 03423
262DRP PNBNOTY 872 3 1-2 1-2-2 0-2 0-2 2-1-2 2 0-1-2 0 0 0 0 03513
262DRP EECNOTS 681 7 1-1-2-2-2-1 0 0-2 2 0-2 0 0 0-2 0 0 0 0 03513
262BAFBPNDNOSY 43810 1 1 1 0-1-1-1 0-1 0 0-1 0 0 0-1 0 0 0 0 03513
262BAFBEEELING 613 3-2-2-1 0-2-1 0 0-1 0 0 0 0 0 1-1 0 0 0 0 03513
273DRP PNCNOTS 955 6-1-1 1 1-1-1 1 0-1-1-1-1-1 0 0-1-1-1 1 1 13521
```

```
273DRP EEDNOSY 668 0 1-1-1-1-1-1 0 0-1-1-1-1-1 0 0-1-1-1 1 1 13521
273BAFBPNELING 696 6 1 1 1 1 1 1 0 0 1-1 1 1-1 0 0 1-1-1 1 1 13521
273BAFBEEFVIS  674 7 1 1 1 1 1 1 0 0 1 0 1 1 0 0 0 1-1-1 1 1 13521
284DRP PNDNOSY 919 5-1-1-1-1-2-1-1 0-1 1-1-1 1 0 0-1-1 1 1 1 13511
284DRP EEELING 539 0-1-1-1-1-1-1-1 0-1 1-1-1-1 0 1-1-1 1 1 1 13511
284BAFBPNFVIS  360 6 1 1 1 1 1 1 1 0 1-1 1 1-1 0 1 1-1 1 1 1 13511
284BAFBEEGALL  466 7 1 1 1 1 1 1 0 0 1-1 1 1-1 0 1 1-1 1 1 1 13511
295DRP PNELING1447 5-1-1 1-1-1-1 0 0-1-1-1-1 1 0 0-1 1 1 1 1 13215
295DRP EEFVIS 1456 2-2-1-2-1-2-1 0 0-1 1-1-1 1 0 0-1 1 1 1 1 13215
295BAFBPNGALL  651 6 1 1 1 1 1 1 0 0 1-1 1 1-1 0 0 1 1 1 1 1 13215
295BAFBEEHNONE 875 5 0 1 1 1 1 1 0 0 1 0 1 1-1 0 0 1 1 1 1 1 13215
306BAFBEEANOWS 801 7 0 0 1 1 0 1 1 0 0 0 0 0 0 0 0 0-1-1-1 1 13521
306DRP PNFVIS 1077 2 0-1-1-1-1-1-1 0-1-1-1-1 0 0 0-1-1-1-1 1 13521
306DRP EEGALL  719 1-1 0 1 1 1 0 0 0 0 1-1 0-1 0 0 0-1-1-1 1 13521
306BAFBPNHNONE 911 3 0 0 0 0 0 0 0 0 0 0 0 1-1 0 0 0-1-1-1 1 13521
317BAFBPNANOWS 684 6 2 2 1 1 2 2 1 1 2-2 1 1-2 1 1 2 2-2-1 2 12523
317BAFBEEBNOTY 541 7 1 1 1 2 2 1 2 1 1-2 1 1 0 0 0 1 2-2-1 2 12523
317DRP PNGALL 1024 0 1 1 1 0 1 2-1 0 1-2 1 1 1 0 0 1 2-2-1 2 12523
317DRP EEHNONE1122 0-1-1 0 0-1 1-1 0-1-1-1-1 0 0 0-2 2-2-1 2 12523
328DRP EEANOWS 679 5-2-2-2-2-2-2-2 0-2 1-1-1-1 0 0-2-1-1 2 2 22521
328BAFBPNBNOTY 311 6 2 2 2 2 2 2 2 0 2 0 2 2 0 0 0 2-1-1 2 2 22521
328BAFBEECNOTS 373 3 2 2 2 2 2 2 2 0 2 0 2 2 0 0 0 2-1-1 2 2 22521
328DRP PNHNONE 872 3-1-1 0-1-1-1-1 1-2 0-1-1 0 0-1-1-1-1 2 2 22521
RUN;
PROC CORR ALPHA;
  VAR COH02 COH03;
RUN;
PROC FREQ;
  TABLES COH02 COH03;
RUN;
PROC CORR ALPHA;
  VAR QLT08 QLT14 QLT15;
RUN;
PROC FREQ;
  TABLES QLT08 QLT14 QLT15;
RUN;
PROC CORR ALPHA;
  VAR MAN06 MAN12 MAN16;
RUN;
PROC FREQ;
  TABLES MAN06 MAN12 MAN16;
RUN;
PROC CORR ALPHA;
  VAR REL04 REL09 REL11;
RUN;
PROC FREQ;
  TABLES REL04 REL09 REL11;
RUN;
PROC CORR ALPHA;
  VAR QTY07 QTY10 QTY13;
RUN;
PROC FREQ;
  TABLES QTY07 QTY10 QTY13;
RUN;
PROC CORR ALPHA;
  VAR QTY10 QTY13R;
RUN;
PROC FREQ;
```

```
  TABLES QTY10 QTY13R;
RUN;
PROC CORR ALPHA;
  VAR USE01 USE05;
RUN;
PROC FREQ;
  TABLES USE01 USE05;
RUN;
PROC CORR ALPHA;
  VAR USE01 COH02 COH03 REL04 USE05 MAN06 QTY07 QLT08 REL09 QTY10
      REL11 MAN12 QTY13 QTY13R QLT14 QLT15 MAN16;
RUN;
PROC FREQ;
  TABLES USE01 COH02 COH03 REL04 USE05 MAN06 QTY07 QLT08 REL09 QTY10
         REL11 MAN12 QTY13 QTY13R QLT14 QLT15 MAN16;
RUN;
PROC CORR ALPHA;
  VAR P65 P66 P67 P68 P69;
RUN;
PROC FREQ;
  TABLES P65 P66 P67 P68 P69;
RUN;
```

.LIS File (Results)

Entire Data Set

2 'VAR' Variables: COH02 COH03
Cronbach Coefficient Alpha
for RAW variables : 0.788413
for STANDARDIZED variables: 0.799862

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
COH02	0.666474	.	0.666474	.
COH03	0.666474	.	0.666474	.

3 'VAR' Variables: QLT08 QLT14 QLT15
Cronbach Coefficient Alpha
for RAW variables : 0.836742
for STANDARDIZED variables: 0.857541

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QLT08	0.722385	0.762870	0.740912	0.791126
QLT14	0.781449	0.716583	0.793566	0.740516
QLT15	0.661800	0.863357	0.662233	0.863499

3 'VAR' Variables: MAN06 MAN12 MAN16
Cronbach Coefficient Alpha
for RAW variables : 0.924117
for STANDARDIZED variables: 0.924519

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
MAN06	0.805918	0.921552	0.804053	0.924311
MAN12	0.841936	0.894731	0.840109	0.895602
MAN16	0.894810	0.849763	0.895443	0.850282

3 'VAR' Variables: REL04 REL09 REL11
Cronbach Coefficient Alpha
for RAW variables : 0.919515
for STANDARDIZED variables: 0.920004

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
REL04	0.802835	0.912295	0.800601	0.914509
REL09	0.892771	0.836605	0.893481	0.838203
REL11	0.821203	0.898260	0.820777	0.898305

3 'VAR' Variables: QTY07 QTY10 QTY13

Cronbach Coefficient Alpha

for RAW variables : -1.23746

for STANDARDIZED variables: -1.18364

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QTY07	-0.413780	-0.285529	-0.403792	-0.294846
QTY10	-0.384684	-0.457504	-0.370500	-0.469202
QTY13	-0.276853	-1.043559	-0.277871	-1.044518

2 'VAR' Variables: QTY10 QTY13R

Cronbach Coefficient Alpha

for RAW variables : 0.222110

for STANDARDIZED variables: 0.227707

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QTY10	0.128482	.	0.128482	.
QTY13R	0.128482	.	0.128482	.

2 'VAR' Variables: USE01 USE05

Cronbach Coefficient Alpha

for RAW variables : 0.854922

for STANDARDIZED variables: 0.856314

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
USE01	0.748731	.	0.748731	.
USE05	0.748731	.	0.748731	.

17 'VAR' Variables: USE01 COH02 COH03 REL04 USE05 MAN06
QTY07 QLT08 REL09 QTY10 REL11 MAN12
QTY13 QTY13R QLT14 QLT15 MAN16

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
USE01	120	0.35833	1.10610	43.00000	-2.00000	2.00000
COH02	120	0.22500	1.14100	27.00000	-2.00000	2.00000
COH03	120	0.63333	0.91609	76.00000	-2.00000	2.00000
REL04	120	0.30000	1.10461	36.00000	-2.00000	2.00000
USE05	120	0.15000	1.19277	18.00000	-2.00000	2.00000
MAN06	120	0.40000	1.06432	48.00000	-2.00000	2.00000
QTY07	120	0.19167	0.99828	23.00000	-2.00000	2.00000
QLT08	120	0.19167	0.59826	23.00000	-1.00000	2.00000
REL09	120	0.08333	1.11960	10.00000	-2.00000	2.00000
QTY10	120	-0.12500	1.03358	-15.00000	-2.00000	2.00000
REL11	120	0.06667	1.01859	8.00000	-2.00000	2.00000
MAN12	120	0.22500	1.01636	27.00000	-2.00000	2.00000
QTY13	120	-0.59167	0.81474	-71.00000	-2.00000	2.00000
QTY13R	120	0.59167	0.81474	71.00000	-2.00000	2.00000
QLT14	120	0.19167	0.58404	23.00000	-1.00000	2.00000
QLT15	120	0.23333	0.82740	28.00000	-2.00000	2.00000
MAN16	120	0.20833	1.12941	25.00000	-2.00000	2.00000

Cronbach Coefficient Alpha
for RAW variables : 0.905522
for STANDARDIZED variables: 0.897753

Deleted Variable	Raw Variables Correlation with Total	Raw Variables Alpha	Std. Variables Correlation with Total	Std. Variables Alpha
USE01	0.694938	0.895928	0.687234	0.887443
COH02	0.847235	0.890170	0.836500	0.882249
COH03	0.680777	0.897014	0.664055	0.888236
REL04	0.819858	0.891405	0.808494	0.883234
USE05	0.841567	0.890125	0.822816	0.882731
MAN06	0.784220	0.892907	0.771636	0.884523
QTY07	0.725358	0.895230	0.731159	0.885929
QLT08	0.509138	0.902806	0.538870	0.892464
REL09	0.860989	0.889785	0.846734	0.881888
QTY10	-0.512934	0.932105	-0.497151	0.923858
REL11	0.819625	0.891986	0.811715	0.883121
MAN12	0.849383	0.891000	0.828237	0.882540
QTY13	-0.230038	0.919819	-0.253606	0.917031
QTY13R	0.080082	0.912609	0.068415	0.907494
QLT14	0.525823	0.902583	0.556968	0.891859
QLT15	0.521160	0.901720	0.551304	0.892049
MAN16	0.886492	0.888751	0.865170	0.881235

Correlation Analysis

5 'VAR' Variables: P65 P66 P67 P68 P69

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
P65	120	-0.03333	1.11471	-4.00000	-2.00000	2.00000
P66	120	0.16667	1.13266	20.00000	-2.00000	2.00000
P67	120	0.23333	1.12072	28.00000	-2.00000	2.00000
P68	120	0.60000	1.08775	72.00000	-2.00000	2.00000
P69	120	0.63333	0.98675	76.00000	-2.00000	2.00000

Cronbach Coefficient Alpha

for RAW variables : 0.702298

for STANDARDIZED variables: 0.711967

Deleted Variable	Raw Variables Correlation with Total	Raw Variables Alpha	Std. Variables Correlation with Total	Std. Variables Alpha
P65	0.178582	0.763652	0.181391	0.771831
P66	0.338641	0.703859	0.346556	0.712131
P67	0.518862	0.627033	0.525991	0.640486
P68	0.564463	0.607863	0.574457	0.619861
P69	0.782351	0.522797	0.783602	0.524330

Version A - Non-Cohesive White Space Cues

.SAS Program File

```
TITLE 'Version A - Non-Cohesive White Space Cues';
OPTIONS LINESIZE=80;
DATA dataset;
   INPUT  SUBJ     1-2   GRP        3   EIS   $ 4-7   SEC   $ 8-9
          VER     $ 10   CUES $ 11-14   TIME  15-18   SCORE 19-20
          USE01  21-22   COH02  23-24   COH03 25-26   REL04 27-28
          USE05  29-30   MAN06  31-32   QTY07 33-34   QLT08 35-36
          REL09  37-38   QTY10  39-40   REL11 41-42   MAN12 43-44
          QTY13  45-46   QLT14  47-48   QLT15 49-50   MAN16 51-52
          P65    53-54   P66    55-56   P67   57-58   P68   59-60
          P69    61-62   D70      63    D71     64    D72     65
          D73       66;
   QTY13R = -1*(QTY13);
CARDS;
 11DRP PNANOWS 526 2 2 2 2 2 2 2 2 0 1-1 1 1-1 2 1 2 0 1-1 0 12521
 66BAFBEEANOWS 549 7 1 1 1 1 1 1 1 0 0 1 0 1 1 0 0-1 1-1 1 1-1 13513
 77BAFBPNANOWS 987 3 2 1 1 1 1 2 1 1 1-1 1 1-1 1 1 1 1 0 1 1 12311
 88DRP EEANOWS1607 1-2 0 0 0 0 0 1 0 0 1 0 0-2 0 0 0-1 0 0-1 04214
 91DRP PNANOWS 700 0-1-1-1-2-1-2-2 0-2 1-2-1-1 0 0-2-2-1-2-1-23513
146BAFBEEANOWS 745 4 1 1 1 1 1 1 1 0 1-1 1 1-1 0 1 1 1 0 0 0 14214
157BAFBPNANOWS 391 6 1 1 1 1 1 1 1 1 1-1 0 1-1 1 1 1 1 1 1 1 12521
168DRP EEANOWS 757 4 0-1 1-1 1 0-1 0-1 1 0 1-1 0 0-1-1 2 0 1 22521
171DRP PNANOWS 726 3-1-2 1 1-1-1 1 0-1 1-1-1-1 0 0-1-1-1 2 2 12311
226BAFBEEANOWS 53610 0 1 1 0-1 1 0 0 0 0 0-1 0 0 0 0 2 0 1 1 11115
237BAFBPNANOWS 658 6 2 2 2 2 2 2 2 2 2-1 2 2-1 2 2 2-1-1-1-1-1-11421
248DRP EEANOWS1199 0 0-1 1 0 0-1-1 0-1 1-1-1-1 0-1 0 1-1-1-1 03423
306BAFBEEANOWS 801 7 0 0 1 1 0 1 1 0 0 0 0 0 0 0 0 0-1-1-1 1 13521
317BAFBPNANOWS 684 6 2 2 1 1 2 2 1 1 2-2 1 1-2 1 1 2 2-2-1 2 12523
328DRP EEANOWS 679 5-2-2-2-2-2-2-2 0-2 1-1-1-1 0 0-2-1-1 2 2 22521
RUN;
PROC CORR ALPHA;
  VAR COH02 COH03;
RUN;
PROC FREQ;
  TABLES COH02 COH03;
RUN;
PROC CORR ALPHA;
  VAR QLT08 QLT14 QLT15;
RUN;
PROC FREQ;
  TABLES QLT08 QLT14 QLT15;
RUN;
PROC CORR ALPHA;
  VAR MAN06 MAN12 MAN16;
RUN;
PROC FREQ;
  TABLES MAN06 MAN12 MAN16;
RUN;
PROC CORR ALPHA;
  VAR REL04 REL09 REL11;
RUN;
PROC FREQ;
  TABLES REL04 REL09 REL11;
```

```
RUN;
PROC CORR ALPHA;
  VAR QTY07 QTY10 QTY13;
RUN;
PROC FREQ;
  TABLES QTY07 QTY10 QTY13;
RUN;
PROC CORR ALPHA;
  VAR QTY10 QTY13R;
RUN;
PROC FREQ;
  TABLES QTY10 QTY13R;
RUN;
PROC CORR ALPHA;
  VAR USE01 USE05;
RUN;
PROC FREQ;
  TABLES USE01 USE05;
RUN;
PROC CORR ALPHA;
  VAR USE01 COH02 COH03 REL04 USE05 MAN06 QTY07 QLT08 REL09 QTY10
      REL11 MAN12 QTY13 QTY13R QLT14 QLT15 MAN16;
RUN;
PROC FREQ;
  TABLES USE01 COH02 COH03 REL04 USE05 MAN06 QTY07 QLT08 REL09 QTY10
         REL11 MAN12 QTY13 QTY13R QLT14 QLT15 MAN16;
RUN;
PROC CORR ALPHA;
  VAR P65 P66 P67 P68 P69;
RUN;
PROC FREQ;
  TABLES P65 P66 P67 P68 P69;
RUN;
```

.LIS File (Results)

Version A - Non-Cohesive White Space Cues

2 'VAR' Variables: COH02 COH03
Cronbach Coefficient Alpha
for RAW variables : 0.768627
for STANDARDIZED variables: 0.789009

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
COH02	0.651540	.	0.651540	.
COH03	0.651540	.	0.651540	.

3 'VAR' Variables: QLT08 QLT14 QLT15
Cronbach Coefficient Alpha
for RAW variables : 0.897129
for STANDARDIZED variables: 0.902753

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QLT08	0.785351	0.877193	0.784728	0.879367
QLT14	0.809707	0.842105	0.806488	0.861002
QLT15	0.829925	0.833333	0.829054	0.841686

3 'VAR' Variables: MAN06 MAN12 MAN16
Cronbach Coefficient Alpha
for RAW variables : 0.930337
for STANDARDIZED variables: 0.935301

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
MAN06	0.915639	0.856597	0.908129	0.872545
MAN12	0.800201	0.956407	0.799957	0.957113
MAN16	0.903813	0.861210	0.893380	0.884405

3 'VAR' Variables: REL04 REL09 REL11
Cronbach Coefficient Alpha
for RAW variables : 0.939184
for STANDARDIZED variables: 0.942515

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
REL04	0.830199	0.946619	0.826322	0.957084
REL09	0.935075	0.864097	0.938383	0.870238
REL11	0.879801	0.917197	0.878016	0.917748

3 'VAR' Variables: QTY07 QTY10 QTY13

Cronbach Coefficient Alpha

for RAW variables : -2.23846

for STANDARDIZED variables: -1.23913

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QTY07	-0.617914	0.193939	-0.535403	0.221074
QTY10	-0.593280	-0.208333	-0.418836	-0.283819
QTY13	-0.033384	-3.917526	0.000000	-4.222222

2 'VAR' Variables: QTY10 QTY13R

Cronbach Coefficient Alpha

for RAW variables : -.240602

for STANDARDIZED variables: -.283819

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QTY10	-0.124274	.	-0.124274	.
QTY13R	-0.124274	.	-0.124274	.

2 'VAR' Variables: USE01 USE05

Cronbach Coefficient Alpha

for RAW variables : 0.923754

for STANDARDIZED variables: 0.927190

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
USE01	0.864263	.	0.864263	.
USE05	0.864263	.	0.864263	.

17 'VAR' Variables: USE01 COH02 COH03 REL04 USE05 MAN06
QTY07 QLT08 REL09 QTY10 REL11 MAN12
QTY13 QTY13R QLT14 QLT15 MAN16

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
USE01	15	0.33333	1.39728	5.00000	-2.00000	2.00000
COH02	15	0.26667	1.38701	4.00000	-2.00000	2.00000
COH03	15	0.73333	1.03280	11.00000	-2.00000	2.00000
REL04	15	0.40000	1.24212	6.00000	-2.00000	2.00000
USE05	15	0.40000	1.24212	6.00000	-2.00000	2.00000
MAN06	15	0.46667	1.40746	7.00000	-2.00000	2.00000
QTY07	15	0.33333	1.29099	5.00000	-2.00000	2.00000
QLT08	15	0.33333	0.61721	5.00000	0	2.00000
REL09	15	0.13333	1.30201	2.00000	-2.00000	2.00000
QTY10	15	-0.06667	1.03280	-1.00000	-2.00000	1.00000
REL11	15	0.13333	1.06010	2.00000	-2.00000	2.00000
MAN12	15	0.26667	1.03280	4.00000	-1.00000	2.00000
QTY13	15	-0.93333	0.59362	-14.00000	-2.00000	0
QTY13R	15	0.93333	0.59362	14.00000	0	2.00000
QLT14	15	0.46667	0.74322	7.00000	0	2.00000
QLT15	15	0.33333	0.81650	5.00000	-1.00000	2.00000
MAN16	15	0.26667	1.33452	4.00000	-2.00000	2.00000

Cronbach Coefficient Alpha
for RAW variables : 0.934350
for STANDARDIZED variables: 0.919491

Deleted Variable	Raw Variables Correlation with Total	Raw Variables Alpha	Std. Variables Correlation with Total	Std. Variables Alpha
USE01	0.868248	0.924713	0.867373	0.907657
COH02	0.885110	0.924209	0.875714	0.907420
COH03	0.796409	0.927410	0.776581	0.910209
REL04	0.864258	0.925049	0.851867	0.908095
USE05	0.890390	0.924345	0.888046	0.907070
MAN06	0.938082	0.922564	0.925143	0.906012
QTY07	0.827213	0.925973	0.825365	0.908842
QLT08	0.634596	0.932295	0.651729	0.913653
REL09	0.951316	0.922446	0.942200	0.905524
QTY10	-0.879706	0.959808	-0.878613	0.950232
REL11	0.908816	0.924743	0.901472	0.906688
MAN12	0.842298	0.926398	0.847561	0.908217
QTY13	-0.125510	0.941376	-0.190569	0.935023
QTY13R	0.035597	0.939532	0.015193	0.930093
QLT14	0.764572	0.929644	0.780784	0.910091
QLT15	0.652519	0.931063	0.674312	0.913036
MAN16	0.954423	0.922246	0.941851	0.905534

5 'VAR' Variables: P65 P66 P67 P68 P69

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
P65	15	-0.06667	1.27988	-1.00000	-2.00000	2.00000
P66	15	-0.20000	1.08233	-3.00000	-2.00000	2.00000
P67	15	0.06667	1.22280	1.00000	-2.00000	2.00000
P68	15	0.40000	1.18322	6.00000	-1.00000	2.00000
P69	15	0.66667	1.04654	10.00000	-2.00000	2.00000

Cronbach Coefficient Alpha
for RAW variables : 0.665903
for STANDARDIZED variables: 0.674861

Deleted Variable	Raw Variables Correlation with Total	Raw Variables Alpha	Std. Variables Correlation with Total	Std. Variables Alpha
P65	0.216972	0.711417	0.217122	0.712741
P66	0.115753	0.732724	0.128336	0.746799
P67	0.548222	0.549930	0.561710	0.561857
P68	0.515615	0.568151	0.509259	0.586841
P69	0.821436	0.433934	0.828665	0.422626

Version B - Non-Cohesive Typographic Cues

.SAS Program File

```
TITLE 'Version B - Non-Cohesive Typographic Cues';
OPTIONS LINESIZE=80;
DATA dataset;
   INPUT  SUBJ     1-2   GRP        3   EIS   $ 4-7   SEC   $ 8-9
          VER     $ 10   CUES $ 11-14   TIME  15-18   SCORE 19-20
          USE01  21-22   COH02  23-24   COH03 25-26   REL04 27-28
          USE05  29-30   MAN06  31-32   QTY07 33-34   QLT08 35-36
          REL09  37-38   QTY10  39-40   REL11 41-42   MAN12 43-44
          QTY13  45-46   QLT14  47-48   QLT15 49-50   MAN16 51-52
          P65    53-54   P66    55-56   P67   57-58   P68   59-60
          P69    61-62   D70      63    D71     64    D72     65
          D73       66;
   QTY13R = -1*(QTY13);
CARDS;
 11DRP EEBNOTY 812 3-1-1-1-2-1-1-1 0-1-1-1-1 1 0-1-1 0 1-1 0 12521
 22DRP PNBNOTY 868 0-1-1-1-1-1-1 0 0-1-1-1-1 1 0-1-1-1 0 1 1 03523
 77BAFBEEBNOTY 701 3-1 0 1 1-1 0 1 0 0 0 1 1-1 0 0 0 1 0 1 1 12311
 88BAFBPNBNOTY 614 5 1 1 0 1 1 1 1 1 1-1 1 1-1 1 1 1-1 0 0-1 04214
 88BAFBEECNOTS 794 3 0 1 0 0 0 0 1 1 1 0 1 1-2 1 1 1-1 0 0-1 04214
 91DRP EEBNOTY 853 0 0 0 1 0 0 1-1 0-1 1 0 0 0 0 0 1-2-1-2-1-23513
102DRP PNBNOTY1183 1 1 0 0-1 1 1 0 0 1-1 0 0-1 0 0 1 0 1 0 1 14524
157BAFBEEBNOTY 41010 1 1 1 1 1 1 1 1 1-1 1 1-1 1 1 1 1 1 1 1 12521
168BAFBPNBNOTY 523 6 1 1 1 1 1 1-1 0 0-1 0 1-1 0 0 1-1 2 0 1 22521
171DRP EEBNOTY 706 9-1-1 1-1-1-1-1 0-1 1-1-1-1 0-1-1-1-1 2 2 12311
182DRP PNBNOTY 822 0 1 1 1 1 1 1 1 0-1 1-1 1-1 0 1 1-2 2-2 2 01521
237BAFBEEBNOTY 441 3 2 2 2 2 2 2 2 2 2-1 2 2-1 2 2 2-1-1-1-1-11421
248BAFBPNBNOTY 326 6 0 0 1-1-1-1-1 0-1-1-1-1-1-1-1-2-1 1-1-1-1 03423
262DRP PNBNOTY 872 3 1-2 1-2-2 0-2 0-2 2-1-2 2 0-1-2 0 0 0 0 03513
317BAFBEEBNOTY 541 7 1 1 1 2 2 1 2 1 1-2 1 1 0 0 0 1 2-2-1 2 12523
328BAFBPNBNOTY 311 6 2 2 2 2 2 2 2 0 2 0 2 2 0 0 0 2-1-1 2 2 22521
RUN;
PROC CORR ALPHA;
  VAR COH02 COH03;
RUN;
PROC FREQ;
  TABLES COH02 COH03;
RUN;
PROC CORR ALPHA;
  VAR QLT08 QLT14 QLT15;
RUN;
PROC FREQ;
  TABLES QLT08 QLT14 QLT15;
RUN;
PROC CORR ALPHA;
  VAR MAN06 MAN12 MAN16;
RUN;
PROC FREQ;
  TABLES MAN06 MAN12 MAN16;
RUN;
PROC CORR ALPHA;
  VAR REL04 REL09 REL11;
RUN;
PROC FREQ;
```

```
  TABLES REL04 REL09 REL11;
RUN;
PROC CORR ALPHA;
  VAR QTY07 QTY10 QTY13;
RUN;
PROC FREQ;
  TABLES QTY07 QTY10 QTY13;
RUN;
PROC CORR ALPHA;
  VAR QTY10 QTY13R;
RUN;
PROC FREQ;
  TABLES QTY10 QTY13R;
RUN;
PROC CORR ALPHA;
  VAR USE01 USE05;
RUN;
PROC FREQ;
  TABLES USE01 USE05;
RUN;
PROC CORR ALPHA;
  VAR USE01 COH02 COH03 REL04 USE05 MAN06 QTY07 QLT08 REL09 QTY10
      REL11 MAN12 QTY13 QTY13R QLT14 QLT15 MAN16;
RUN;
PROC FREQ;
  TABLES USE01 COH02 COH03 REL04 USE05 MAN06 QTY07 QLT08 REL09 QTY10
         REL11 MAN12 QTY13 QTY13R QLT14 QLT15 MAN16;
RUN;
PROC CORR ALPHA;
  VAR P65 P66 P67 P68 P69;
RUN;
PROC FREQ;
  TABLES P65 P66 P67 P68 P69;
RUN;
```

.LIS File (Results)

Version B - Non-Cohesive Typographic Cues

2 'VAR' Variables: COH02 COH03
Cronbach Coefficient Alpha
for RAW variables : 0.657609
for STANDARDIZED variables: 0.673036

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
COH02	0.507200	.	0.507200	.
COH03	0.507200	.	0.507200	.

3 'VAR' Variables: QLT08 QLT14 QLT15
Cronbach Coefficient Alpha
for RAW variables : 0.898955
for STANDARDIZED variables: 0.929967

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QLT08	0.814112	0.878049	0.830002	0.919164
QLT14	0.916602	0.783217	0.923302	0.843797
QLT15	0.820783	0.926316	0.817786	0.928718

3 'VAR' Variables: MAN06 MAN12 MAN16
Cronbach Coefficient Alpha
for RAW variables : 0.951700
for STANDARDIZED variables: 0.952939

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
MAN06	0.855244	0.964794	0.855100	0.964807
MAN12	0.899089	0.929902	0.894035	0.935894
MAN16	0.956150	0.884328	0.954392	0.889732

3 'VAR' Variables: REL04 REL09 REL11
Cronbach Coefficient Alpha
for RAW variables : 0.924425
for STANDARDIZED variables: 0.931328

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
REL04	0.785900	0.952532	0.787864	0.955500
REL09	0.858442	0.880597	0.869101	0.892091
REL11	0.919560	0.845506	0.922918	0.848320

3 'VAR' Variables: QTY07 QTY10 QTY13

Cronbach Coefficient Alpha

for RAW variables : -1.23633

for STANDARDIZED variables: -1.01030

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QTY07	-0.530991	0.371951	-0.530992	0.372257
QTY10	-0.239186	-1.350384	-0.175756	-1.408944
QTY13	-0.222588	-1.403509	-0.171272	-1.442809

2 'VAR' Variables: QTY10 QTY13R

Cronbach Coefficient Alpha

for RAW variables : -.592233

for STANDARDIZED variables: -.593010

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QTY10	-0.228696	.	-0.228696	.
QTY13R	-0.228696	.	-0.228696	.

2 'VAR' Variables: USE01 USE05

Cronbach Coefficient Alpha

for RAW variables : 0.853893

for STANDARDIZED variables: 0.866209

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
USE01	0.763994	.	0.763994	.
USE05	0.763994	.	0.763994	.

17 'VAR' Variables: USE01 COH02 COH03 REL04 USE05 MAN06
QTY07 QLT08 REL09 QTY10 REL11 MAN12
QTY13 QTY13R QLT14 QLT15 MAN16

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
USE01	16	0.43750	1.03078	7.00000	-1.00000	2.00000
COH02	16	0.31250	1.13835	5.00000	-2.00000	2.00000
COH03	16	0.68750	0.87321	11.00000	-1.00000	2.00000
REL04	16	0.18750	1.37689	3.00000	-2.00000	2.00000
USE05	16	0.25000	1.29099	4.00000	-2.00000	2.00000
MAN06	16	0.43750	1.03078	7.00000	-1.00000	2.00000
QTY07	16	0.25000	1.29099	4.00000	-2.00000	2.00000
QLT08	16	0.37500	0.61914	6.00000	0	2.00000
REL09	16	0.06250	1.23659	1.00000	-2.00000	2.00000
QTY10	16	-0.31250	1.07819	-5.00000	-2.00000	2.00000
REL11	16	0.18750	1.10868	3.00000	-1.00000	2.00000
MAN12	16	0.31250	1.19548	5.00000	-2.00000	2.00000
QTY13	16	-0.43750	1.03078	-7.00000	-2.00000	2.00000
QTY13R	16	0.43750	1.03078	7.00000	-2.00000	2.00000
QLT14	16	0.25000	0.68313	4.00000	-1.00000	2.00000
QLT15	16	0	1.03280	0	-2.00000	2.00000
MAN16	16	0.37500	1.20416	6.00000	-2.00000	2.00000

Cronbach Coefficient Alpha
for RAW variables : 0.926207
for STANDARDIZED variables: 0.923643

Deleted Variable	Raw Variables Correlation with Total	Raw Variables Alpha	Std. Variables Correlation with Total	Std. Variables Alpha
USE01	0.719872	0.919727	0.723108	0.916513
COH02	0.918224	0.914085	0.903524	0.911681
COH03	0.534976	0.924115	0.525471	0.921640
REL04	0.889824	0.913979	0.877886	0.912376
USE05	0.876182	0.914617	0.862790	0.912785
MAN06	0.885241	0.915681	0.880113	0.912316
QTY07	0.807114	0.916763	0.798286	0.914517
QLT08	0.640885	0.923320	0.653733	0.918333
REL09	0.844738	0.915735	0.841333	0.913363
QTY10	-0.337617	0.944075	-0.324311	0.941785
REL11	0.866906	0.915656	0.867270	0.912664
MAN12	0.938629	0.913150	0.923551	0.911135
QTY13	-0.544438	0.947325	-0.542569	0.946489
QTY13R	0.418963	0.926821	0.407410	0.924620
QLT14	0.617356	0.923275	0.637151	0.918764
QLT15	0.827744	0.917088	0.843983	0.913292
MAN16	0.920652	0.913627	0.906622	0.911596

5 'VAR' Variables: P65 P66 P67 P68 P69

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
P65	16	-0.37500	1.14746	-6.00000	-2.00000	2.00000
P66	16	0	1.15470	0	-2.00000	2.00000
P67	16	-0.06250	1.23659	-1.00000	-2.00000	2.00000
P68	16	0.50000	1.21106	8.00000	-1.00000	2.00000
P69	16	0.43750	1.03078	7.00000	-2.00000	2.00000

Cronbach Coefficient Alpha
for RAW variables : 0.601643
for STANDARDIZED variables: 0.613213

Deleted Variable	Raw Variables Correlation with Total	Raw Variables Alpha	Std. Variables Correlation with Total	Std. Variables Alpha
P65	0.129073	0.658320	0.137250	0.669713
P66	0.017050	0.708333	0.026549	0.717380
P67	0.398040	0.523693	0.405672	0.538830
P68	0.554265	0.429598	0.559526	0.453260
P69	0.861424	0.277421	0.860336	0.261616

Version C - Non-Cohesive Tense Cues

.SAS Program File

```
TITLE 'Version C - Non-Cohesive Tense Cues';
OPTIONS LINESIZE=80;
DATA dataset;
   INPUT  SUBJ     1-2   GRP        3   EIS    $ 4-7   SEC    $ 8-9
          VER     $ 10   CUES $ 11-14   TIME   15-18   SCORE  19-20
          USE01   21-22  COH02  23-24   COH03  25-26   REL04  27-28
          USE05   29-30  MAN06  31-32   QTY07  33-34   QLT08  35-36
          REL09   37-38  QTY10  39-40   REL11  41-42   MAN12  43-44
          QTY13   45-46  QLT14  47-48   QLT15  49-50   MAN16  51-52
          P65     53-54  P66    55-56   P67    57-58   P68    59-60
          P69     61-62  D70      63    D71      64    D72      65
          D73       66;
   QTY13R = -1*(QTY13);
CARDS;
 22DRP EECNOTS 654 0-1 1 1-1-1 0-1 0 0-1 0 1 0 0 0 1-1 0 1 1 03523
 33DRP PNCNOTS 650 3 2 1 1 1 1 1 1 0 1-1 1 1-1 0 1 1 1 1 1 1 14223
 88BAFBEECNOTS 794 3 0 1 0 0 0 0 1 1 1 0 1 1-2 1 1 1-1 0 0-1 04214
102DRP EECNOTS1444 0 1 0-1-2 0 1 0 0-1 2-1 0-1 0 1 0 0 1 0 1 14524
113DRP PNCNOTS1065 2 1 1 1 1-1-1-1 0-1-1-1 0-1 1 1-1 0 2 0 2 22423
168BAFBEECNOTS 570 2-1-1 1 1-1 1 1-1 0-1-1 1-1 0 0 1-1 2 0 1 22521
182DRP EECNOTS 627 4-1-1 1-1-1 1 1 0-1 2-1-1-1 0 1-1-2 2-2 2 01521
262DRP EECNOTS 681 7 1-1-2-2-2-1 0 0-2 2 0-2 0 0 0-2 0 0 0 0 03513
273DRP PNCNOTS 955 6-1-1 1 1-1-1 1 0-1-1-1-1-1 0 0-1-1-1 1 1 13521
328BAFBEECNOTS 373 3 2 2 2 2 2 2 2 0 2 0 2 2 0 0 0 2-1-1 2 2 22521
RUN;
PROC CORR ALPHA;
  VAR COH02 COH03;
RUN;
PROC FREQ;
  TABLES COH02 COH03;
RUN;
PROC CORR ALPHA;
  VAR QLT08 QLT14 QLT15;
RUN;
PROC FREQ;
  TABLES QLT08 QLT14 QLT15;
RUN;
PROC CORR ALPHA;
  VAR MAN06 MAN12 MAN16;
RUN;
PROC FREQ;
  TABLES MAN06 MAN12 MAN16;
RUN;
PROC CORR ALPHA;
  VAR REL04 REL09 REL11;
RUN;
PROC FREQ;
  TABLES REL04 REL09 REL11;
RUN;
PROC CORR ALPHA;
  VAR QTY07 QTY10 QTY13;
RUN;
PROC FREQ;
```

```
  TABLES QTY07 QTY10 QTY13;
RUN;
PROC CORR ALPHA;
  VAR QTY10 QTY13R;
RUN;
PROC FREQ;
  TABLES QTY10 QTY13R;
RUN;
PROC CORR ALPHA;
  VAR USE01 USE05;
RUN;
PROC FREQ;
  TABLES USE01 USE05;
RUN;
PROC CORR ALPHA;
  VAR USE01 COH02 COH03 REL04 USE05 MAN06 QTY07 QLT08 REL09 QTY10
      REL11 MAN12 QTY13 QTY13R QLT14 QLT15 MAN16;
RUN;
PROC FREQ;
  TABLES USE01 COH02 COH03 REL04 USE05 MAN06 QTY07 QLT08 REL09 QTY10
         REL11 MAN12 QTY13 QTY13R QLT14 QLT15 MAN16;
RUN;
PROC CORR ALPHA;
  VAR P65 P66 P67 P68 P69;
RUN;
PROC FREQ;
  TABLES P65 P66 P67 P68 P69;
RUN;
```

.LIS File (Results)

Version C - Non-Cohesive Tense Cues

2 'VAR' Variables: COH02 COH03
Cronbach Coefficient Alpha
for RAW variables : 0.586510
for STANDARDIZED variables: 0.586800

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
COH02	0.415227	.	0.415227	.
COH03	0.415227	.	0.415227	.

3 'VAR' Variables: QLT08 QLT14 QLT15
Cronbach Coefficient Alpha
for RAW variables : 0.743802
for STANDARDIZED variables: 0.751554

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QLT08	0.572598	0.655738	0.580948	0.666667
QLT14	0.620174	0.615385	0.622475	0.618034
QLT15	0.534522	0.714286	0.536423	0.717140

3 'VAR' Variables: MAN06 MAN12 MAN16
Cronbach Coefficient Alpha
for RAW variables : 0.911585
for STANDARDIZED variables: 0.909452

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
MAN06	0.676369	0.983957	0.675477	0.984478
MAN12	0.882843	0.820755	0.865831	0.829858
MAN16	0.939418	0.768831	0.929306	0.774056

3 'VAR' Variables: REL04 REL09 REL11
Cronbach Coefficient Alpha
for RAW variables : 0.807818
for STANDARDIZED variables: 0.818389

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
REL04	0.532397	0.888889	0.524276	0.891907
REL09	0.860837	0.514139	0.876558	0.526118
REL11	0.624056	0.775194	0.641701	0.779846

3 'VAR' Variables: QTY07 QTY10 QTY13

Cronbach Coefficient Alpha

for RAW variables : 0.030405

for STANDARDIZED variables: -.037404

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QTY07	-0.036481	0.144796	-0.093644	0.186047
QTY10	0.099504	-0.396040	0.112718	-0.441333
QTY13	-0.020515	0.075758	-0.054185	0.080093

2 'VAR' Variables: QTY10 QTY13R

Cronbach Coefficient Alpha

for RAW variables : -.169312

for STANDARDIZED variables: -.228571

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QTY10	-0.102564	.	-0.102564	.
QTY13R	-0.102564	.	-0.102564	.

2 'VAR' Variables: USE01 USE05

Cronbach Coefficient Alpha

for RAW variables : 0.764569

for STANDARDIZED variables: 0.765543

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
USE01	0.620145	.	0.620145	.
USE05	0.620145	.	0.620145	.

17 'VAR' Variables: USE01 COH02 COH03 REL04 USE05 MAN06
QTY07 QLT08 REL09 QTY10 REL11 MAN12
QTY13 QTY13R QLT14 QLT15 MAN16

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
USE01	10	0.30000	1.25167	3.00000	-1.00000	2.00000
COH02	10	0.20000	1.13529	2.00000	-1.00000	2.00000
COH03	10	0.50000	1.17851	5.00000	-2.00000	2.00000
REL04	10	0	1.41421	0	-2.00000	2.00000
USE05	10	-0.40000	1.17379	-4.00000	-2.00000	2.00000
MAN06	10	0.30000	1.05935	3.00000	-1.00000	2.00000
QTY07	10	0.50000	0.97183	5.00000	-1.00000	2.00000
QLT08	10	0	0.47140	0	-1.00000	1.00000
REL09	10	-0.20000	1.22927	-2.00000	-2.00000	2.00000
QTY10	10	0.10000	1.37032	1.00000	-1.00000	2.00000
REL11	10	-0.10000	1.10050	-1.00000	-1.00000	2.00000
MAN12	10	0.20000	1.22927	2.00000	-2.00000	2.00000
QTY13	10	-0.80000	0.63246	-8.00000	-2.00000	0
QTY13R	10	0.80000	0.63246	8.00000	0	2.00000
QLT14	10	0.20000	0.42164	2.00000	0	1.00000
QLT15	10	0.50000	0.52705	5.00000	0	1.00000
MAN16	10	0.10000	1.28668	1.00000	-2.00000	2.00000

Cronbach Coefficient Alpha
for RAW variables : 0.842672
for STANDARDIZED variables: 0.813128

Deleted Variable	Raw Variables Correlation with Total	Raw Variables Alpha	Std. Variables Correlation with Total	Std. Variables Alpha
USE01	0.439397	0.835400	0.456969	0.800474
COH02	0.743123	0.817569	0.773888	0.779802
COH03	0.468389	0.833421	0.419257	0.802836
REL04	0.501184	0.832295	0.479824	0.799033
USE05	0.945647	0.804317	0.918695	0.769852
MAN06	0.656323	0.823408	0.573754	0.793029
QTY07	0.499366	0.832061	0.436845	0.801737
QLT08	0.174175	0.844246	0.245249	0.813471
REL09	0.933008	0.803855	0.905240	0.770790
QTY10	-0.397043	0.885726	-0.348876	0.846672
REL11	0.757314	0.817241	0.746795	0.781627
MAN12	0.803399	0.812482	0.767451	0.780236
QTY13	-0.127751	0.853333	-0.283526	0.843246
QTY13R	-0.003680	0.849797	0.056941	0.824504
QLT14	0.055283	0.846553	0.117262	0.821023
QLT15	0.099871	0.846136	0.165390	0.818209
MAN16	0.789807	0.812621	0.739893	0.782091

5 'VAR' Variables: P65 P66 P67 P68 P69

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
P65	10	-0.60000	0.84327	-6.00000	-2.00000	1.00000
P66	10	0.60000	1.17379	6.00000	-1.00000	2.00000
P67	10	0.30000	1.05935	3.00000	-2.00000	2.00000
P68	10	1.00000	0.94281	10.00000	-1.00000	2.00000
P69	10	0.90000	0.87560	9.00000	0	2.00000

Cronbach Coefficient Alpha
for RAW variables : 0.331376
for STANDARDIZED variables: 0.404816

Deleted Variable	Raw Variables Correlation with Total	Raw Variables Alpha	Std. Variables Correlation with Total	Std. Variables Alpha
P65	0.222439	0.239766	0.208951	0.349644
P66	-0.101999	0.534351	-0.060030	0.537994
P67	-0.073546	0.483932	0.018556	0.486998
P68	0.337100	0.127946	0.313127	0.265634
P69	0.692086	-0.199377	0.679348	-0.085043

Version D - Non-Cohesive Syntax Cues

.SAS Program File

```
TITLE 'Version D - Non-Cohesive Syntax Cues';
OPTIONS LINESIZE=80;
DATA dataset;
   INPUT  SUBJ     1-2   GRP        3   EIS   $ 4-7   SEC   $ 8-9
          VER      $ 10  CUES $ 11-14   TIME  15-18   SCORE 19-20
          USE01  21-22   COH02  23-24   COH03 25-26   REL04 27-28
          USE05  29-30   MAN06  31-32   QTY07 33-34   QLT08 35-36
          REL09  37-38   QTY10  39-40   REL11 41-42   MAN12 43-44
          QTY13  45-46   QLT14  47-48   QLT15 49-50   MAN16 51-52
          P65    53-54   P66    55-56   P67   57-58   P68   59-60
          P69    61-62   D70      63    D71     64    D72     65
          D73      66;
   QTY13R = -1*(QTY13);
CARDS;
 11BAFBEEDNOSY 554 6 1 1 1 1 1 1 1 0 1-1 1 1-1 0 1 1 0 1-1 0 12521
 22BAFBPNDNOSY 364 4 2 1 1 1 2 1 1 0 1 0 1 1-1 0 0 1-1 0 1 1 03523
 33DRP EEDNOSY 852 1 1 1 1 1 1 1 1 0 1 1 1 1-1 0-1 1 1 1 1 1 14223
 44DRP PNDNOSY 846 0-1-2 0-1-1-1 0-1-2 1-1-1-1 0-1-2 1 1 1 0 02521
 91BAFBEEDNOSY 720 6 0 1 1 1 0 1 0 0 1 1 0 1 0 0 0 1-2-1-2-1-23513
102BAFBPNDNOSY 845 8 1 1 1 2 1 2 0 0 1-1 1 1-1 0 1 1 0 1 0 1 14524
113DRP EEDNOSY 996 0-1-1-1 1-1-1-1 0 1 1-1 0-1 0 1-1 0 2 0 2 22423
124DRP PNDNOSY1242 0 1 2 2 1 1 1 1 1 1 0 1 1-1 1 1 1 1 2 1 2 23521
171BAFBEEDNOSY 532 3 1 1 1 1 1 1 1 0 1-1 1 1-1 1 1 1-1-1 2 2 12311
182BAFBPNDNOSY 450 9 1 2 1 1 1 1 1 0-1-1-1 1-1 0-1 1-2 2-2 2 01521
204DRP PNDNOSY1042 2-1-1 0 0-1 0-1 1-1 2 0-1-1 1 1-1 1 0 1 0 12523
262BAFBPNDNOSY 43810 1 1 1 0-1-1-1 0-1 0 0-1 0 0 0-1 0 0 0 0 03513
273DRP EEDNOSY 668 0 1-1-1-1-1-1 0 0-1-1-1-1-1 0 0-1-1-1 1 1 13521
284DRP PNDNOSY 919 5-1-1-1-1-2-1-1 0-1 1-1-1 1 0 0-1-1 1 1 1 13511
RUN;
PROC CORR ALPHA;
  VAR COH02 COH03;
RUN;
PROC FREQ;
  TABLES COH02 COH03;
RUN;
PROC CORR ALPHA;
  VAR QLT08 QLT14 QLT15;
RUN;
PROC FREQ;
  TABLES QLT08 QLT14 QLT15;
RUN;
PROC CORR ALPHA;
  VAR MAN06 MAN12 MAN16;
RUN;
PROC FREQ;
  TABLES MAN06 MAN12 MAN16;
RUN;
PROC CORR ALPHA;
  VAR REL04 REL09 REL11;
RUN;
PROC FREQ;
  TABLES REL04 REL09 REL11;
RUN;
```

```
PROC CORR ALPHA;
  VAR QTY07 QTY10 QTY13;
RUN;
PROC FREQ;
  TABLES QTY07 QTY10 QTY13;
RUN;
PROC CORR ALPHA;
  VAR QTY10 QTY13R;
RUN;
PROC FREQ;
  TABLES QTY10 QTY13R;
RUN;
PROC CORR ALPHA;
  VAR USE01 USE05;
RUN;
PROC FREQ;
  TABLES USE01 USE05;
RUN;
PROC CORR ALPHA;
  VAR USE01 COH02 COH03 REL04 USE05 MAN06 QTY07 QLT08 REL09 QTY10
      REL11 MAN12 QTY13 QTY13R QLT14 QLT15 MAN16;
RUN;
PROC FREQ;
  TABLES USE01 COH02 COH03 REL04 USE05 MAN06 QTY07 QLT08 REL09 QTY10
         REL11 MAN12 QTY13 QTY13R QLT14 QLT15 MAN16;
RUN;
PROC CORR ALPHA;
  VAR P65 P66 P67 P68 P69;
RUN;
PROC FREQ;
  TABLES P65 P66 P67 P68 P69;
RUN;
```

.LIS File (Results)

Version D - Non-Cohesive Syntax Cues

2 'VAR' Variables: COH02 COH03
Cronbach Coefficient Alpha
for RAW variables : 0.904306
for STANDARDIZED variables: 0.927218

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
COH02	0.864312	.	0.864312	.
COH03	0.864312	.	0.864312	.

3 'VAR' Variables: QLT08 QLT14 QLT15
Cronbach Coefficient Alpha
for RAW variables : 0.755844
for STANDARDIZED variables: 0.812733

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QLT08	0.680082	0.611111	0.710182	0.693737
QLT14	0.657226	0.661017	0.684770	0.720485
QLT15	0.597763	0.806452	0.596983	0.809282

3 'VAR' Variables: MAN06 MAN12 MAN16
Cronbach Coefficient Alpha
for RAW variables : 0.972096
for STANDARDIZED variables: 0.973948

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
MAN06	0.924059	0.969849	0.922870	0.976012
MAN12	0.942743	0.961494	0.941815	0.962556
MAN16	0.965231	0.943135	0.965885	0.945247

3 'VAR' Variables: REL04 REL09 REL11
Cronbach Coefficient Alpha
for RAW variables : 0.892726
for STANDARDIZED variables: 0.895677

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
REL04	0.811111	0.832335	0.802770	0.843899
REL09	0.851298	0.801527	0.850654	0.801683
REL11	0.735153	0.894444	0.732407	0.903636

3 'VAR' Variables: QTY07 QTY10 QTY13

Cronbach Coefficient Alpha

for RAW variables : -1.65957

for STANDARDIZED variables: -1.56938

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QTY07	-0.653390	0.414634	-0.660803	0.458645
QTY10	-0.382143	-1.923077	-0.252097	-2.166072
QTY13	-0.157378	-2.315789	-0.233002	-2.391562

2 'VAR' Variables: QTY10 QTY13R

Cronbach Coefficient Alpha

for RAW variables : -.708333

for STANDARDIZED variables: -.847216

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QTY10	-0.297560	.	-0.297560	.
QTY13R	-0.297560	.	-0.297560	.

2 'VAR' Variables: USE01 USE05

Cronbach Coefficient Alpha

for RAW variables : 0.874534

for STANDARDIZED variables: 0.881755

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
USE01	0.788517	.	0.788517	.
USE05	0.788517	.	0.788517	.

17 'VAR' Variables: USE01 COH02 COH03 REL04 USE05 MAN06
QTY07 QLT08 REL09 QTY10 REL11 MAN12
QTY13 QTY13R QLT14 QLT15 MAN16

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
USE01	14	0.42857	1.01635	6.00000	-1.00000	2.00000
COH02	14	0.35714	1.27745	5.00000	-2.00000	2.00000
COH03	14	0.50000	0.94054	7.00000	-1.00000	2.00000
REL04	14	0.50000	0.94054	7.00000	-1.00000	2.00000
USE05	14	0.07143	1.20667	1.00000	-2.00000	2.00000
MAN06	14	0.28571	1.06904	4.00000	-1.00000	2.00000
QTY07	14	0.14286	0.86444	2.00000	-1.00000	1.00000
QLT08	14	0.07143	0.47463	1.00000	-1.00000	1.00000
REL09	14	0.07143	1.14114	1.00000	-2.00000	1.00000
QTY10	14	0.14286	1.02711	2.00000	-1.00000	2.00000
REL11	14	0.07143	0.91687	1.00000	-1.00000	1.00000
MAN12	14	0.21429	0.97496	3.00000	-1.00000	1.00000
QTY13	14	-0.71429	0.61125	-10.00000	-1.00000	1.00000
QTY13R	14	0.71429	0.61125	10.00000	-1.00000	1.00000
QLT14	14	0.21429	0.42582	3.00000	0	1.00000
QLT15	14	0.21429	0.80178	3.00000	-1.00000	1.00000
MAN16	14	0.07143	1.14114	1.00000	-2.00000	1.00000

Cronbach Coefficient Alpha
for RAW variables : 0.902490
for STANDARDIZED variables: 0.883027

Deleted Variable	Raw Variables Correlation with Total	Raw Variables Alpha	Std. Variables Correlation with Total	Std. Variables Alpha
USE01	0.637546	0.894467	0.598213	0.873591
COH02	0.824529	0.886674	0.809452	0.865265
COH03	0.807726	0.888981	0.795810	0.865813
REL04	0.846303	0.887684	0.821906	0.864763
USE05	0.893675	0.883755	0.862383	0.863125
MAN06	0.899474	0.884504	0.881163	0.862361
QTY07	0.688905	0.893324	0.645110	0.871772
QLT08	0.341973	0.902835	0.385083	0.881652
REL09	0.769587	0.889268	0.764971	0.867046
QTY10	-0.469787	0.929677	-0.437340	0.909752
REL11	0.835402	0.888290	0.843476	0.863892
MAN12	0.906996	0.885206	0.865451	0.863001
QTY13	-0.433683	0.917576	-0.472009	0.910837
QTY13R	0.329337	0.902956	0.303590	0.884647
QLT14	0.248269	0.904275	0.296476	0.884906
QLT15	0.221396	0.906287	0.275371	0.885673
MAN16	0.935599	0.882397	0.907057	0.861302

5 'VAR' Variables: P65 P66 P67 P68 P69

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
P65	14	-0.28571	1.06904	-4.00000	-2.00000	1.00000
P66	14	0.57143	1.08941	8.00000	-1.00000	2.00000
P67	14	0.28571	1.20439	4.00000	-2.00000	2.00000
P68	14	0.85714	0.94926	12.00000	-1.00000	2.00000
P69	14	0.64286	1.00821	9.00000	-2.00000	2.00000

Cronbach Coefficient Alpha
for RAW variables : 0.726686
for STANDARDIZED variables: 0.736415

Deleted Variable	Raw Variables Correlation with Total	Raw Variables Alpha	Std. Variables Correlation with Total	Std. Variables Alpha
P65	0.481386	0.681988	0.456989	0.706181
P66	0.333016	0.738729	0.364916	0.739556
P67	0.371757	0.731660	0.380608	0.733989
P68	0.475252	0.685587	0.478756	0.698038
P69	0.850661	0.533333	0.856050	0.540666

Version E - Non-Cohesive Visual Cues, Cohesive Linguistic Cues

.SAS Program File

```
TITLE 'Version E - Non-Cohesive Visual Cues, Cohesive Linguistic Cues';
OPTIONS LINESIZE=80;
DATA dataset;
   INPUT  SUBJ     1-2   GRP        3   EIS   $ 4-7   SEC   $ 8-9
          VER     $ 10   CUES $ 11-14   TIME  15-18   SCORE 19-20
          USE01  21-22   COH02  23-24   COH03 25-26   REL04 27-28
          USE05  29-30   MAN06  31-32   QTY07 33-34   QLT08 35-36
          REL09  37-38   QTY10  39-40   REL11 41-42   MAN12 43-44
          QTY13  45-46   QLT14  47-48   QLT15 49-50   MAN16 51-52
          P65    53-54   P66    55-56   P67   57-58   P68   59-60
          P69    61-62   D70      63    D71     64    D72     65
          D73       66;
   QTY13R = -1*(QTY13);
CARDS;
 22BAFBEEELING 414 7 1 1 1 1 2 2 0 0 1-1 1 1 0 0 0 1-1 0 1 1 03523
 33BAFBPNELING 789 7 1 1 1 1 0 1 0 0 1-1 0 0 2 1 1 1 1 1 1 1 14223
 44DRP EEELING1061 8-1-1 1 0-1 2-1 0-1 1-1-1 0 1 1-1 1 1 1 0 02521
 55DRP PNELING 945 6 1 0 2 1 1 1 1 0 1-1 0 1-1 0 0 1 1 0 1 1 02521
102BAFBEEELING 908 3 1 1 1 2 2 1 0 0 2-1 2 1-1 0 1 2 0 1 0 1 14524
113BAFBPNELING 891 6 1-1-1-2-1-1-1 0-2 1-2-1-2 0-1-1 0 2 0 2 22423
124DRP EEELING1347 2 1 1 1 1 1 1 1 2 1-1 1 0-1 1 1 1 1 2 1 2 23521
135DRP PNELING1286 5 0-1 0-1-1-1-1-1-2 0-2 0 1-1-1-1-1 0 1 1 12521
182BAFBEEELING 426 1 1 1 1 1 1 1 1 0 1-1-1 1-1 0-1 1-2 2-2 2 01521
204DRP EEELING 677 1 1 0 1-1 0-1 1 1-1 2-1-1-2 1 1-1 1 0 1 0 12523
215DRP PNELING1105 2 0 0 1-1-1 0-1 0-1 0-1 0-1 0 0-1 0-2-2-2-22513
262BAFBEEELING 613 3-2-2-1 0-2-1 0 0-1 0 0 0 0 0 1-1 0 0 0 0 03513
273BAFBPNELING 696 6 1 1 1 1 1 1 0 0 1-1 1 1-1 0 0 1-1-1 1 1 13521
284DRP EEELING 539 0-1-1-1-1-1-1-1 0-1 1-1-1-1 0 1-1-1 1 1 1 13511
295DRP PNELING1447 5-1-1 1-1-1-1 0 0-1-1-1-1 1 0 0-1 1 1 1 1 13215
RUN;
PROC CORR ALPHA;
  VAR COH02 COH03;
RUN;
PROC FREQ;
  TABLES COH02 COH03;
RUN;
PROC CORR ALPHA;
  VAR QLT08 QLT14 QLT15;
RUN;
PROC FREQ;
  TABLES QLT08 QLT14 QLT15;
RUN;
PROC CORR ALPHA;
  VAR MAN06 MAN12 MAN16;
RUN;
PROC FREQ;
  TABLES MAN06 MAN12 MAN16;
RUN;
PROC CORR ALPHA;
  VAR REL04 REL09 REL11;
RUN;
PROC FREQ;
  TABLES REL04 REL09 REL11;
```

```
RUN;
PROC CORR ALPHA;
  VAR QTY07 QTY10 QTY13;
RUN;
PROC FREQ;
  TABLES QTY07 QTY10 QTY13;
RUN;
PROC CORR ALPHA;
  VAR QTY10 QTY13R;
RUN;
PROC FREQ;
  TABLES QTY10 QTY13R;
RUN;
PROC CORR ALPHA;
  VAR USE01 USE05;
RUN;
PROC FREQ;
  TABLES USE01 USE05;
RUN;
PROC CORR ALPHA;
  VAR USE01 COH02 COH03 REL04 USE05 MAN06 QTY07 QLT08 REL09 QTY10
      REL11 MAN12 QTY13 QTY13R QLT14 QLT15 MAN16;
RUN;
PROC FREQ;
  TABLES USE01 COH02 COH03 REL04 USE05 MAN06 QTY07 QLT08 REL09 QTY10
         REL11 MAN12 QTY13 QTY13R QLT14 QLT15 MAN16;
RUN;
PROC CORR ALPHA;
  VAR P65 P66 P67 P68 P69;
RUN;
PROC FREQ;
  TABLES P65 P66 P67 P68 P69;
RUN;
```

.LIS File (Results)

Version E - Non-Cohesive Visual Cues, Cohesive Linguistic Cues

2 'VAR' Variables: COH02 COH03
Cronbach Coefficient Alpha
for RAW variables : 0.786585
for STANDARDIZED variables: 0.790385

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
COH02	0.653418	.	0.653418	.
COH03	0.653418	.	0.653418	.

3 'VAR' Variables: QLT08 QLT14 QLT15
Cronbach Coefficient Alpha
for RAW variables : 0.812500
for STANDARDIZED variables: 0.832555

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QLT08	0.633064	0.773006	0.657261	0.802330
QLT14	0.800095	0.641975	0.804789	0.652652
QLT15	0.616111	0.830769	0.622948	0.835013

3 'VAR' Variables: MAN06 MAN12 MAN16
Cronbach Coefficient Alpha
for RAW variables : 0.865385
for STANDARDIZED variables: 0.875952

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
MAN06	0.682528	0.880000	0.673856	0.901033
MAN12	0.757379	0.826271	0.759022	0.826426
MAN16	0.843899	0.712166	0.856986	0.735299

3 'VAR' Variables: REL04 REL09 REL11
Cronbach Coefficient Alpha
for RAW variables : 0.958042
for STANDARDIZED variables: 0.959051

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
REL04	0.938561	0.919732	0.936103	0.922339
REL09	0.937519	0.921053	0.937775	0.921080
REL11	0.865753	0.971061	0.865727	0.974243

3 'VAR' Variables: QTY07 QTY10 QTY13

Cronbach Coefficient Alpha

for RAW variables : -2.62500

for STANDARDIZED variables: -2.71969

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QTY07	-0.507281	-1.324138	-0.517161	-1.336119
QTY10	-0.599186	-0.453988	-0.607851	-0.487496
QTY13	-0.544862	-1.125000	-0.531515	-1.176148

2 'VAR' Variables: QTY10 QTY13R

Cronbach Coefficient Alpha

for RAW variables : 0.569733

for STANDARDIZED variables: 0.571940

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QTY10	0.400501	.	0.400501	.
QTY13R	0.400501	.	0.400501	.

2 'VAR' Variables: USE01 USE05

Cronbach Coefficient Alpha

for RAW variables : 0.862423

for STANDARDIZED variables: 0.871582

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
USE01	0.772393	.	0.772393	.
USE05	0.772393	.	0.772393	.

17 'VAR' Variables: USE01 COH02 COH03 REL04 USE05 MAN06
QTY07 QLT08 REL09 QTY10 REL11 MAN12
QTY13 QTY13R QLT14 QLT15 MAN16

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
USE01	15	0.26667	1.03280	4.00000	-2.00000	1.00000
COH02	15	-0.06667	1.03280	-1.00000	-2.00000	1.00000
COH03	15	0.60000	0.91026	9.00000	-1.00000	2.00000
REL04	15	0.06667	1.16292	1.00000	-2.00000	2.00000
USE05	15	0	1.25357	0	-2.00000	2.00000
MAN06	15	0.26667	1.16292	4.00000	-1.00000	2.00000
QTY07	15	-0.06667	0.79881	-1.00000	-1.00000	1.00000
QLT08	15	0.13333	0.63994	2.00000	-1.00000	2.00000
REL09	15	-0.13333	1.30201	-2.00000	-2.00000	2.00000
QTY10	15	-0.20000	1.01419	-3.00000	-1.00000	2.00000
REL11	15	-0.33333	1.17514	-5.00000	-2.00000	2.00000
MAN12	15	0	0.84515	0	-1.00000	1.00000
QTY13	15	-0.46667	1.12546	-7.00000	-2.00000	2.00000
QTY13R	15	0.46667	1.12546	7.00000	-2.00000	2.00000
QLT14	15	0.20000	0.56061	3.00000	-1.00000	1.00000
QLT15	15	0.26667	0.79881	4.00000	-1.00000	1.00000
MAN16	15	0	1.13389	0	-1.00000	2.00000

Cronbach Coefficient Alpha
for RAW variables : 0.867553
for STANDARDIZED variables: 0.863011

Deleted Variable	Raw Variables Correlation with Total	Raw Variables Alpha	Std. Variables Correlation with Total	Std. Variables Alpha
USE01	0.608907	0.855179	0.591953	0.850687
COH02	0.864639	0.843523	0.844772	0.838868
COH03	0.647659	0.854448	0.643191	0.848341
REL04	0.868629	0.841305	0.838553	0.839166
USE05	0.886412	0.839111	0.853063	0.838470
MAN06	0.724208	0.848864	0.705851	0.845437
QTY07	0.611949	0.856857	0.632718	0.848822
QLT08	0.386562	0.864740	0.434699	0.857737
REL09	0.934791	0.835599	0.909516	0.835743
QTY10	-0.627933	0.902913	-0.584624	0.898212
REL11	0.780875	0.845810	0.768042	0.842519
MAN12	0.644922	0.855211	0.561387	0.852075
QTY13	-0.225362	0.891714	-0.237200	0.885390
QTY13R	0.001726	0.882354	0.031974	0.874779
QLT14	0.350847	0.865918	0.394190	0.859517
QLT15	0.213314	0.870001	0.249427	0.865755
MAN16	0.897895	0.840203	0.855237	0.838365

5 'VAR' Variables: P65 P66 P67 P68 P69

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
P65	15	0	1.00000	0	-2.00000	1.00000
P66	15	0.53333	1.12546	8.00000	-2.00000	2.00000
P67	15	0.40000	1.05560	6.00000	-2.00000	1.00000
P68	15	0.80000	1.01419	12.00000	-2.00000	2.00000
P69	15	0.60000	0.98561	9.00000	-2.00000	2.00000

Cronbach Coefficient Alpha
for RAW variables : 0.736364
for STANDARDIZED variables: 0.736467

Deleted Variable	Raw Variables Correlation with Total	Raw Variables Alpha	Std. Variables Correlation with Total	Std. Variables Alpha
P65	0.127843	0.813559	0.125217	0.818749
P66	0.568371	0.662005	0.573966	0.661344
P67	0.458437	0.705882	0.472294	0.700545
P68	0.592443	0.654788	0.579182	0.659274
P69	0.823386	0.563591	0.820334	0.557036

Version F - Non-Cohesive Linguistic Cues, Cohesive Visual Cues

.SAS Program File

```
TITLE 'Version F - Non-Cohesive Linguistic Cues, Cohesive Visual Cues';
OPTIONS LINESIZE=80;
DATA dataset;
   INPUT  SUBJ     1-2   GRP        3   EIS   $ 4-7   SEC   $ 8-9
          VER     $ 10   CUES $ 11-14   TIME  15-18   SCORE 19-20
          USE01  21-22   COH02  23-24   COH03 25-26   REL04 27-28
          USE05  29-30   MAN06  31-32   QTY07 33-34   QLT08 35-36
          REL09  37-38   QTY10  39-40   REL11 41-42   MAN12 43-44
          QTY13  45-46   QLT14  47-48   QLT15 49-50   MAN16 51-52
          P65    53-54   P66    55-56   P67   57-58   P68   59-60
          P69    61-62   D70      63    D71     64    D72     65
          D73       66;
   QTY13R = -1*(QTY13);
CARDS;
 33BAFBEEFVIS  363 1-1-1 1 1 1 1 0 0 0 0 1 1 0 0-1 1 1 1 1 1 14223
 44BAFBPNFVIS  626 1 0 1 1 1 1 0 1 1 1 0 1 0 0 1 1 1 1 1 1 0 02521
 55DRP EEFVIS  689 0-1-1 1-1-1 1-2 0-1 0-2-1-1 0-1 0 1 0 1 1 02521
 66DRP PNFVIS  908 0 1 1 1 0-1 0 0 0 1-1 1 0 1 0-1 1-1 1 1-1 13513
113BAFBEEFVIS  575 7 2 1 1 1 2 2 1 1 1-1 1 1-1 0 1 2 0 2 0 2 22423
124BAFBPNFVIS  853 5 2 2 2 1 1 2 2 2 1-1 1 2 2 1 2 1 1 2 1 2 23521
135DRP EEFVIS  914 0-1-1-1 0-1 1 0 0 0 1 0 0-1 0 1 0-1 0 1 1 12521
146DRP PNFVIS 1395 2 1 1 0 0 0 0 1 0 0-1 0 0-1 0 0 0 1 0 0 0 14214
204BAFBPNFVIS  798 9 2 0 1 0 0-1 0 1-1 1 0 1-1 1 1-1 1 0 1 0 12523
215DRP EEFVIS 1156 0-1-1 0-1 0 0 0 0-1 1-1-1-1 0 0 0 0-2-2-2-22513
226DRP PNFVIS 1022 5 1 0 1 0-1-1 1 0 0 1 0-1-1 0 0-1 2 0 1 1 11115
273BAFBEEFVIS  674 7 1 1 1 1 1 1 0 0 1 0 1 1 0 0 0 1-1-1 1 1 13521
284BAFBPNFVIS  360 6 1 1 1 1 1 1 1 0 1-1 1 1-1 0 1 1-1 1 1 1 13511
295DRP EEFVIS 1456 2-2-1-2-1-2-1 0 0-1 1-1-1 1 0 0-1 1 1 1 1 13215
306DRP PNFVIS 1077 2 0-1-1-1-1-1-1 0-1-1-1-1 0 0 0-1-1-1-1 1 13521
RUN;
PROC CORR ALPHA;
  VAR COH02 COH03;
RUN;
PROC FREQ;
  TABLES COH02 COH03;
RUN;
PROC CORR ALPHA;
  VAR QLT08 QLT14 QLT15;
RUN;
PROC FREQ;
  TABLES QLT08 QLT14 QLT15;
RUN;
PROC CORR ALPHA;
  VAR MAN06 MAN12 MAN16;
RUN;
PROC FREQ;
  TABLES MAN06 MAN12 MAN16;
RUN;
PROC CORR ALPHA;
  VAR REL04 REL09 REL11;
RUN;
PROC FREQ;
  TABLES REL04 REL09 REL11;
```

```
RUN;
PROC CORR ALPHA;
  VAR QTY07 QTY10 QTY13;
RUN;
PROC FREQ;
  TABLES QTY07 QTY10 QTY13;
RUN;
PROC CORR ALPHA;
  VAR QTY10 QTY13R;
RUN;
PROC FREQ;
  TABLES QTY10 QTY13R;
RUN;
PROC CORR ALPHA;
  VAR USE01 USE05;
RUN;
PROC FREQ;
  TABLES USE01 USE05;
RUN;
PROC CORR ALPHA;
  VAR USE01 COH02 COH03 REL04 USE05 MAN06 QTY07 QLT08 REL09 QTY10
      REL11 MAN12 QTY13 QTY13R QLT14 QLT15 MAN16;
RUN;
PROC FREQ;
  TABLES USE01 COH02 COH03 REL04 USE05 MAN06 QTY07 QLT08 REL09 QTY10
         REL11 MAN12 QTY13 QTY13R QLT14 QLT15 MAN16;
RUN;
PROC CORR ALPHA;
  VAR P65 P66 P67 P68 P69;
RUN;
PROC FREQ;
  TABLES P65 P66 P67 P68 P69;
RUN;
```

.LIS File (Results)

Version F - Non-Cohesive Linguistic Cues, Cohesive Visual Cues

2 'VAR' Variables: COH02 COH03
Cronbach Coefficient Alpha
for RAW variables : 0.780362
for STANDARDIZED variables: 0.780362

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
COH02	0.639831	.	0.639831	.
COH03	0.639831	.	0.639831	.

3 'VAR' Variables: QLT08 QLT14 QLT15
Cronbach Coefficient Alpha
for RAW variables : 0.839623
for STANDARDIZED variables: 0.892762

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QLT08	0.844797	0.648649	0.876846	0.769000
QLT14	0.761783	0.821256	0.783900	0.851949
QLT15	0.723596	0.873786	0.712768	0.912172

3 'VAR' Variables: MAN06 MAN12 MAN16
Cronbach Coefficient Alpha
for RAW variables : 0.875826
for STANDARDIZED variables: 0.876200

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
MAN06	0.812190	0.776758	0.813748	0.776972
MAN12	0.668663	0.904393	0.668544	0.906185
MAN16	0.810307	0.782123	0.807439	0.782846

3 'VAR' Variables: REL04 REL09 REL11
Cronbach Coefficient Alpha
for RAW variables : 0.958741
for STANDARDIZED variables: 0.961037

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
REL04	0.922287	0.936782	0.920359	0.940012
REL09	0.890307	0.955490	0.889236	0.962849
REL11	0.940590	0.923611	0.941246	0.924451

3 'VAR' Variables: QTY07 QTY10 QTY13

Cronbach Coefficient Alpha

for RAW variables : -.284483

for STANDARDIZED variables: -.325491

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QTY07	0.022263	-0.753846	0.006023	-0.757515
QTY10	-0.320775	0.383333	-0.320775	0.383333
QTY13	-0.012965	-0.594203	-0.030293	-0.596926

2 'VAR' Variables: QTY10 QTY13R

Cronbach Coefficient Alpha

for RAW variables : 0.429825

for STANDARDIZED variables: 0.431015

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QTY10	0.274709	.	0.274709	.
QTY13R	0.274709	.	0.274709	.

2 'VAR' Variables: USE01 USE05

Cronbach Coefficient Alpha

for RAW variables : 0.694737

for STANDARDIZED variables: 0.698548

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
USE01	0.536745	.	0.536745	.
USE05	0.536745	.	0.536745	.

17 'VAR' Variables: USE01 COH02 COH03 REL04 USE05 MAN06
QTY07 QLT08 REL09 QTY10 REL11 MAN12
QTY13 QTY13R QLT14 QLT15 MAN16

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
USE01	15	0.33333	1.29099	5.00000	-2.00000	2.00000
COH02	15	0.13333	1.06010	2.00000	-1.00000	2.00000
COH03	15	0.46667	1.06010	7.00000	-2.00000	2.00000
REL04	15	0.13333	0.83381	2.00000	-1.00000	1.00000
USE05	15	0	1.13389	0	-2.00000	2.00000
MAN06	15	0.33333	1.04654	5.00000	-1.00000	2.00000
QTY07	15	0.26667	0.96115	4.00000	-2.00000	2.00000
QLT08	15	0.33333	0.61721	5.00000	0	2.00000
REL09	15	0.06667	0.88372	1.00000	-1.00000	1.00000
QTY10	15	-0.06667	0.88372	-1.00000	-1.00000	1.00000
REL11	15	0.13333	0.99043	2.00000	-2.00000	1.00000
MAN12	15	0.13333	0.99043	2.00000	-1.00000	2.00000
QTY13	15	-0.26667	0.96115	-4.00000	-1.00000	2.00000
QTY13R	15	0.26667	0.96115	4.00000	-2.00000	1.00000
QLT14	15	0.20000	0.41404	3.00000	0	1.00000
QLT15	15	0.26667	0.88372	4.00000	-1.00000	2.00000
MAN16	15	0.26667	0.96115	4.00000	-1.00000	2.00000

Cronbach Coefficient Alpha
for RAW variables : 0.888665
for STANDARDIZED variables: 0.889906

Deleted Variable	Raw Variables Correlation with Total	Raw Variables Alpha	Std. Variables Correlation with Total	Std. Variables Alpha
USE01	0.667827	0.877138	0.669696	0.878882
COH02	0.815475	0.870870	0.807458	0.873745
COH03	0.692064	0.876069	0.684894	0.878322
REL04	0.898163	0.870751	0.882961	0.870872
USE05	0.808216	0.870620	0.797428	0.874123
MAN06	0.574526	0.880888	0.556837	0.882992
QTY07	0.707277	0.875991	0.716192	0.877163
QLT08	0.666040	0.880672	0.694876	0.877953
REL09	0.807121	0.873113	0.778217	0.874847
QTY10	-0.500703	0.914103	-0.473042	0.916621
REL11	0.827648	0.871064	0.813305	0.873524
MAN12	0.854236	0.870003	0.852863	0.872022
QTY13	0.101125	0.897556	0.129807	0.897763
QTY13R	-0.289861	0.910164	-0.314727	0.911885
QLT14	0.462531	0.886828	0.484466	0.885582
QLT15	0.552224	0.881875	0.587124	0.881898
MAN16	0.698450	0.876323	0.666770	0.878990

5 'VAR' Variables: P65 P66 P67 P68 P69

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
P65	15	0.26667	1.03280	4.00000	-1.00000	2.00000
P66	15	0.33333	1.11270	5.00000	-2.00000	2.00000
P67	15	0.53333	0.91548	8.00000	-2.00000	1.00000
P68	15	0.60000	1.05560	9.00000	-2.00000	2.00000
P69	15	0.80000	0.94112	12.00000	-2.00000	2.00000

Cronbach Coefficient Alpha
for RAW variables : 0.775650
for STANDARDIZED variables: 0.778680

Deleted Variable	Raw Variables Correlation with Total	Raw Variables Alpha	Std. Variables Correlation with Total	Std. Variables Alpha
P65	0.162843	0.854586	0.159803	0.856778
P66	0.708657	0.673108	0.713969	0.681121
P67	0.614510	0.715214	0.614249	0.716616
P68	0.640759	0.701046	0.647716	0.704904
P69	0.696664	0.686913	0.692016	0.689090

Version G - All Cues Cohesive

.SAS Program File

```
TITLE 'Version G - All Cues Cohesive';
OPTIONS LINESIZE=80;
DATA dataset;
   INPUT  SUBJ     1-2   GRP        3   EIS   $ 4-7   SEC   $ 8-9
          VER     $ 10   CUES $ 11-14   TIME  15-18   SCORE 19-20
          USE01  21-22   COH02  23-24   COH03 25-26   REL04 27-28
          USE05  29-30   MAN06  31-32   QTY07 33-34   QLT08 35-36
          REL09  37-38   QTY10  39-40   REL11 41-42   MAN12 43-44
          QTY13  45-46   QLT14  47-48   QLT15 49-50   MAN16 51-52
          P65    53-54   P66    55-56   P67   57-58   P68   59-60
          P69    61-62   D70      63    D71     64    D72     65
          D73       66;
   QTY13R = -1*(QTY13);
CARDS;
 44BAFBEEGALL  503 1 0 0 1 0 0 1 0 0 0 0 0 1 0-1 0 0 1 1 1 0 02521
 55BAFBPNGALL  407 6 1 1 1 1 1 1 1 0 1-1 1 1-1 0 0 1 1 0 1 1 02521
 66DRP EEGALL  955 0-1-1-1 1-2-1 0 0 1 0 1-1 0 0 1-1-1 1 1-1 13513
 77DRP PNGALL 1080 2 2 1 1 1 2 1 1 0 1-1 1 1-1 0 0 1 1 0 1 1 12311
124BAFBEEGALL  685 3 1 2 2 2 2 1 2 1 1-1 1 2-1 1 1 2 1 2 1 2 23521
135BAFBPNGALL  52610 1 1 1 0 1 1 0 0 0-1 0 0-1 0 1 1-1 0 1 1 12521
146DRP EEGALL 1098 3-1-1-1-2-1-1-1-1-1-1 1-1-1-1-1 0-1 1 0 0 0 14214
157DRP PNGALL  755 3-1 0 1 0-1 0-1 0 0 1-1 0-1 0 0-1 1 1 1 1 12521
204BAFBEEGALL 1123 3-1-1-1-1-2 1 1 1-1 1 0-1-1 1 1-1 1 0 1 0 12523
215BAFBPNGALL  801 3 1 1 1 1 1 1 1 0 1-1 1 1-1 0 1 1 0-2-2-2-22513
226DRP EEGALL  875 1-1-2 0-1-1 0-1 0-1-1-1-1 0-1-1-1 2 0 1 1 11115
237DRP PNGALL 1429 2 2 2 2 2 2 2 2 2-1 2 2-1 2 2 2-1-1-1-1-11421
284BAFBEEGALL  466 7 1 1 1 1 1 1 0 0 1-1 1 1-1 0 1 1-1 1 1 1 13511
295BAFBPNGALL  651 6 1 1 1 1 1 1 0 0 1-1 1 1-1 0 0 1 1 1 1 1 13215
306DRP EEGALL  719 1-1 0 1 1 1 0 0 0 0 1-1 0-1 0 0 0-1-1-1 1 13521
317DRP PNGALL 1024 0 1 1 1 0 1 2-1 0 1-2 1 1 1 0 0 1 2-2-1 2 12523
RUN;
PROC CORR ALPHA;
  VAR COH02 COH03;
RUN;
PROC FREQ;
  TABLES COH02 COH03;
RUN;
PROC CORR ALPHA;
  VAR QLT08 QLT14 QLT15;
RUN;
PROC FREQ;
  TABLES QLT08 QLT14 QLT15;
RUN;
PROC CORR ALPHA;
  VAR MAN06 MAN12 MAN16;
RUN;
PROC FREQ;
  TABLES MAN06 MAN12 MAN16;
RUN;
PROC CORR ALPHA;
  VAR REL04 REL09 REL11;
RUN;
PROC FREQ;
```

```
  TABLES REL04 REL09 REL11;
RUN;
PROC CORR ALPHA;
  VAR QTY07 QTY10 QTY13;
RUN;
PROC FREQ;
  TABLES QTY07 QTY10 QTY13;
RUN;
PROC CORR ALPHA;
  VAR QTY10 QTY13R;
RUN;
PROC FREQ;
  TABLES QTY10 QTY13R;
RUN;
PROC CORR ALPHA;
  VAR USE01 USE05;
RUN;
PROC FREQ;
  TABLES USE01 USE05;
RUN;
PROC CORR ALPHA;
  VAR USE01 COH02 COH03 REL04 USE05 MAN06 QTY07 QLT08 REL09 QTY10
      REL11 MAN12 QTY13 QTY13R QLT14 QLT15 MAN16;
RUN;
PROC FREQ;
  TABLES USE01 COH02 COH03 REL04 USE05 MAN06 QTY07 QLT08 REL09 QTY10
         REL11 MAN12 QTY13 QTY13R QLT14 QLT15 MAN16;
RUN;
PROC CORR ALPHA;
  VAR P65 P66 P67 P68 P69;
RUN;
PROC FREQ;
  TABLES P65 P66 P67 P68 P69;
RUN;
```

.LIS File (Results)

Version G - All Cues Cohesive

2 'VAR' Variables: COH02 COH03
Cronbach Coefficient Alpha
for RAW variables : 0.910769
for STANDARDIZED variables: 0.919916

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
COH02	0.851707	.	0.851707	.
COH03	0.851707	.	0.851707	.

3 'VAR' Variables: QLT08 QLT14 QLT15
Cronbach Coefficient Alpha
for RAW variables : 0.911672
for STANDARDIZED variables: 0.912997

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QLT08	0.827520	0.875000	0.823755	0.875866
QLT14	0.918024	0.789474	0.921706	0.792091
QLT15	0.741501	0.939655	0.736451	0.946332

3 'VAR' Variables: MAN06 MAN12 MAN16
Cronbach Coefficient Alpha
for RAW variables : 0.926377
for STANDARDIZED variables: 0.927762

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
MAN06	0.775845	0.954413	0.775738	0.955136
MAN12	0.897169	0.853988	0.888592	0.865728
MAN16	0.901661	0.853403	0.895428	0.860111

3 'VAR' Variables: REL04 REL09 REL11
Cronbach Coefficient Alpha
for RAW variables : 0.930978
for STANDARDIZED variables: 0.936977

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
REL04	0.824817	0.939355	0.827753	0.940598
REL09	0.953726	0.835821	0.954196	0.840110
REL11	0.821689	0.928251	0.830497	0.938498

3 'VAR' Variables: QTY07 QTY10 QTY13

Cronbach Coefficient Alpha

for RAW variables : -2.25000

for STANDARDIZED variables: -3.17229

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QTY07	-0.522233	-0.818182	-0.597622	-0.954528
QTY10	-0.470005	-1.424084	-0.532412	-1.777798
QTY13	-0.639398	-0.579387	-0.637393	-0.579891

2 'VAR' Variables: QTY10 QTY13R

Cronbach Coefficient Alpha

for RAW variables : 0.450000

for STANDARDIZED variables: 0.488367

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QTY10	0.323073	.	0.323073	.
QTY13R	0.323073	.	0.323073	.

2 'VAR' Variables: USE01 USE05

Cronbach Coefficient Alpha

for RAW variables : 0.920658

for STANDARDIZED variables: 0.928494

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
USE01	0.866531	.	0.866531	.
USE05	0.866531	.	0.866531	.

17 'VAR' Variables: USE01 COH02 COH03 REL04 USE05 MAN06
QTY07 QLT08 REL09 QTY10 REL11 MAN12
QTY13 QTY13R QLT14 QLT15 MAN16

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
USE01	16	0.31250	1.13835	5.00000	-1.00000	2.00000
COH02	16	0.37500	1.14746	6.00000	-2.00000	2.00000
COH03	16	0.68750	0.94648	11.00000	-1.00000	2.00000
REL04	16	0.43750	1.09354	7.00000	-2.00000	2.00000
USE05	16	0.37500	1.36015	6.00000	-2.00000	2.00000
MAN06	16	0.68750	0.87321	11.00000	-1.00000	2.00000
QTY07	16	0.25000	1.00000	4.00000	-1.00000	2.00000
QLT08	16	0.18750	0.65511	3.00000	-1.00000	2.00000
REL09	16	0.43750	0.89209	7.00000	-1.00000	2.00000
QTY10	16	-0.43750	0.96393	-7.00000	-2.00000	1.00000
REL11	16	0.37500	0.95743	6.00000	-1.00000	2.00000
MAN12	16	0.43750	1.03078	7.00000	-1.00000	2.00000
QTY13	16	-0.68750	0.60208	-11.00000	-1.00000	1.00000
QTY13R	16	0.68750	0.60208	11.00000	-1.00000	1.00000
QLT14	16	0.06250	0.77190	1.00000	-1.00000	2.00000
QLT15	16	0.43750	0.72744	7.00000	-1.00000	2.00000
MAN16	16	0.37500	1.08781	6.00000	-1.00000	2.00000

Cronbach Coefficient Alpha
for RAW variables : 0.920681
for STANDARDIZED variables: 0.908993

Deleted Variable	Raw Variables Correlation with Total	Raw Variables Alpha	Std. Variables Correlation with Total	Std. Variables Alpha
USE01	0.840336	0.908966	0.816821	0.896518
COH02	0.930416	0.905882	0.911532	0.893518
COH03	0.784904	0.911422	0.754425	0.898468
REL04	0.823386	0.909654	0.822421	0.896342
USE05	0.804097	0.910383	0.773873	0.897863
MAN06	0.720648	0.913468	0.713838	0.899724
QTY07	0.739261	0.912486	0.762727	0.898210
QLT08	0.614828	0.916915	0.647246	0.901766
REL09	0.828337	0.910618	0.816377	0.896532
QTY10	-0.621541	0.946006	-0.598505	0.935718
REL11	0.781153	0.911470	0.786793	0.897459
MAN12	0.901642	0.907533	0.878084	0.894583
QTY13	-0.317996	0.932068	-0.351818	0.929604
QTY13R	0.214285	0.923801	0.181318	0.915386
QLT14	0.684556	0.914844	0.722578	0.899454
QLT15	0.567765	0.917492	0.596666	0.903301
MAN16	0.924975	0.906415	0.901041	0.893853

5 'VAR' Variables: P65 P66 P67 P68 P69

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
P65	16	0.43750	1.09354	7.00000	-1.00000	2.00000
P66	16	0.06250	1.12361	1.00000	-2.00000	2.00000
P67	16	0.37500	1.02470	6.00000	-2.00000	1.00000
P68	16	0.50000	1.09545	8.00000	-2.00000	2.00000
P69	16	0.62500	0.95743	10.00000	-2.00000	2.00000

Cronbach Coefficient Alpha
for RAW variables : 0.791440
for STANDARDIZED variables: 0.797907

Deleted Variable	Raw Variables Correlation with Total	Raw Variables Alpha	Std. Variables Correlation with Total	Std. Variables Alpha
P65	0.263667	0.846445	0.264401	0.851357
P66	0.562296	0.755280	0.575511	0.760606
P67	0.714852	0.705546	0.711657	0.716103
P68	0.619987	0.735360	0.629972	0.743167
P69	0.759881	0.695995	0.759325	0.699796

Version H - All Cues Non-Cohesive

.SAS Program File

```
TITLE 'Version H - No Cohesive Cues';
OPTIONS LINESIZE=80;
DATA dataset;
   INPUT  SUBJ     1-2   GRP        3   EIS    $ 4-7   SEC    $ 8-9
          VER     $ 10   CUES $ 11-14   TIME   15-18   SCORE  19-20
          USE01   21-22  COH02   23-24  COH03  25-26   REL04  27-28
          USE05   29-30  MAN06   31-32  QTY07  33-34   QLT08  35-36
          REL09   37-38  QTY10   39-40  REL11  41-42   MAN12  43-44
          QTY13   45-46  QLT14   47-48  QLT15  49-50   MAN16  51-52
          P65     53-54  P66     55-56  P67    57-58   P68    59-60
          P69     61-62  D70       63   D71      64   D72      65
          D73       66;
   QTY13R = -1*(QTY13);
CARDS;
 55BAFBEEHNONE 591 3-1 2 1 1-1 1 0 0 1 0 1 1 0 0 0 1 1 0 1 1 02521
 66BAFBPNHNONE 850 6 2 2 2 2 2 2 0 0 1 0 1 2 0 0 1 2-1 1 1-1 13513
 77DRP EEHNONE 997 2 1-1 0 0 0 1 1 0 0 1 0 0-1 0 1 0 1 0 1 1 12311
 88DRP PNHNONE1010 0 0 0 0 0 0 0 0 0 1 1 0 0-2 0 0 0-1 0 0-1 04214
135BAFBEEHNONE 45410 1 1 1 1 1 1 0 0 1-2 0 1 0 0 0 1-1 0 1 1 12521
146BAFBPNHNONE 399 5 0 0 1 1 0 0 0 0 0-1 0 0-1 0 1 1 1 0 0 0 14214
157DRP EEHNONE 667 3 0 0 1 1 0-1-1 0 0 2-1-1-1 0 0 0 1 1 1 1 12521
168DRP PNHNONE 569 2 1-1 1 1 0 0 0 1 0 2-1 0-2 0 0 0-1 2 0 1 22521
215BAFBEEHNONE 670 7 1-1 0-1 1-1 0 0-1-1-1-1-1 0 0-1 0-2-2-2-22513
226BAFBPNHNONE1163 3 0 1 1 0-1-1 0 0 0 0-1-1 0 0 0-1 2 0 1 1 11115
237DRP EEHNONE 674 0 2 2 2 2 2 2 2 2 2-1 2 2-1 2 2 2-1-1-1-1-11421
248DRP PNHNONE 863 2-1-1 0-1-1 0-1-1-2 1 0-1-1 0-2-1 1-1-1-1 03423
295BAFBEEHNONE 875 5 0 1 1 1 1 1 0 0 1 0 1 1-1 0 0 1 1 1 1 1 13215
306BAFBPNHNONE 911 3 0 0 0 0 0 0 0 0 0 0 0 0 1-1 0 0 0-1-1-1 1 13521
317DRP EEHNONE1122 0-1-1 0 0-1 1-1 0-1-1-1-1 0 0 0-2 2-2-1 2 12523
328DRP PNHNONE 872 3-1-1 0-1-1-1-1 1-2 0-1-1 0 0-1-1-1-1 2 2 22521
RUN;
PROC CORR ALPHA;
  VAR COH02 COH03;
RUN;
PROC FREQ;
  TABLES COH02 COH03;
RUN;
PROC CORR ALPHA;
  VAR QLT08 QLT14 QLT15;
RUN;
PROC FREQ;
  TABLES QLT08 QLT14 QLT15;
RUN;
PROC CORR ALPHA;
  VAR MAN06 MAN12 MAN16;
RUN;
PROC FREQ;
  TABLES MAN06 MAN12 MAN16;
RUN;
PROC CORR ALPHA;
  VAR REL04 REL09 REL11;
RUN;
PROC FREQ;
```

```
  TABLES REL04 REL09 REL11;
RUN;
PROC CORR ALPHA;
  VAR QTY07 QTY10 QTY13;
RUN;
PROC FREQ;
  TABLES QTY07 QTY10 QTY13;
RUN;
PROC CORR ALPHA;
  VAR QTY10 QTY13R;
RUN;
PROC FREQ;
  TABLES QTY10 QTY13R;
RUN;
PROC CORR ALPHA;
  VAR USE01 USE05;
RUN;
PROC FREQ;
  TABLES USE01 USE05;
RUN;
PROC CORR ALPHA;
  VAR USE01 COH02 COH03 REL04 USE05 MAN06 QTY07 QLT08 REL09 QTY10
      REL11 MAN12 QTY13 QTY13R QLT14 QLT15 MAN16;
RUN;
PROC FREQ;
  TABLES USE01 COH02 COH03 REL04 USE05 MAN06 QTY07 QLT08 REL09 QTY10
         REL11 MAN12 QTY13 QTY13R QLT14 QLT15 MAN16;
RUN;
PROC CORR ALPHA;
  VAR P65 P66 P67 P68 P69;
RUN;
PROC FREQ;
  TABLES P65 P66 P67 P68 P69;
RUN;
```

.LIS File (Results)

Version H - No Cohesive Cues

2 'VAR' Variables: COH02 COH03
Cronbach Coefficient Alpha
for RAW variables : 0.832461
for STANDARDIZED variables: 0.892597

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
COH02	0.806027	.	0.806027	.
COH03	0.806027	.	0.806027	.

3 'VAR' Variables: QLT08 QLT14 QLT15
Cronbach Coefficient Alpha
for RAW variables : 0.783673
for STANDARDIZED variables: 0.825238

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QLT08	0.678003	0.652174	0.717621	0.721990
QLT14	0.727066	0.674260	0.744284	0.694332
QLT15	0.585091	0.831541	0.588275	0.849114

3 'VAR' Variables: MAN06 MAN12 MAN16
Cronbach Coefficient Alpha
for RAW variables : 0.915862
for STANDARDIZED variables: 0.916198

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
MAN06	0.747580	0.943662	0.749741	0.944372
MAN12	0.939394	0.785329	0.936838	0.788941
MAN16	0.817447	0.892596	0.813039	0.893799

3 'VAR' Variables: REL04 REL09 REL11
Cronbach Coefficient Alpha
for RAW variables : 0.886097
for STANDARDIZED variables: 0.886904

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
REL04	0.801924	0.819444	0.791933	0.828183
REL09	0.855512	0.771429	0.854225	0.771757
REL11	0.699896	0.904167	0.696950	0.909967

3 'VAR' Variables: QTY07 QTY10 QTY13

Cronbach Coefficient Alpha

for RAW variables : -2.52404

for STANDARDIZED variables: -2.91071

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QTY07	-0.427734	-1.860465	-0.467516	-2.374810
QTY10	-0.598645	-0.562814	-0.615889	-0.568214
QTY13	-0.644658	-0.534091	-0.614043	-0.583285

2 'VAR' Variables: QTY10 QTY13R

Cronbach Coefficient Alpha

for RAW variables : 0.650407

for STANDARDIZED variables: 0.703687

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
QTY10	0.542837	.	0.542837	.
QTY13R	0.542837	.	0.542837	.

2 'VAR' Variables: USE01 USE05

Cronbach Coefficient Alpha

for RAW variables : 0.935065

for STANDARDIZED variables: 0.935213

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
USE01	0.878310	.	0.878310	.
USE05	0.878310	.	0.878310	.

17 'VAR' Variables: USE01 COH02 COH03 REL04 USE05 MAN06
QTY07 QLT08 REL09 QTY10 REL11 MAN12
QTY13 QTY13R QLT14 QLT15 MAN16

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
USE01	16	0.25000	1.00000	4.00000	-1.00000	2.00000
COH02	16	0.18750	1.16726	3.00000	-1.00000	2.00000
COH03	16	0.68750	0.70415	11.00000	0	2.00000
REL04	16	0.43750	0.96393	7.00000	-1.00000	2.00000
USE05	16	0.12500	1.02470	2.00000	-1.00000	2.00000
MAN06	16	0.31250	1.01448	5.00000	-1.00000	2.00000
QTY07	16	-0.06250	0.77190	-1.00000	-1.00000	2.00000
QLT08	16	0.18750	0.65511	3.00000	-1.00000	2.00000
REL09	16	0.06250	1.12361	1.00000	-2.00000	2.00000
QTY10	16	0.06250	1.12361	1.00000	-2.00000	2.00000
REL11	16	-0.06250	0.92871	-1.00000	-1.00000	2.00000
MAN12	16	0.12500	1.08781	2.00000	-1.00000	2.00000
QTY13	16	-0.75000	0.68313	-12.00000	-2.00000	0
QTY13R	16	0.75000	0.68313	12.00000	0	2.00000
QLT14	16	0.12500	0.50000	2.00000	0	2.00000
QLT15	16	0.12500	0.88506	2.00000	-2.00000	2.00000
MAN16	16	0.12500	1.14746	2.00000	-2.00000	2.00000

Cronbach Coefficient Alpha
for RAW variables : 0.912566
for STANDARDIZED variables: 0.909900

Deleted Variable	Raw Variables Correlation with Total	Raw Variables Alpha	Std. Variables Correlation with Total	Std. Variables Alpha
USE01	0.696443	0.904227	0.707716	0.900971
COH02	0.730887	0.902956	0.722515	0.900519
COH03	0.804744	0.903343	0.794890	0.898289
REL04	0.864765	0.899065	0.851512	0.896525
USE05	0.743682	0.902637	0.745915	0.899801
MAN06	0.700557	0.904069	0.693239	0.901413
QTY07	0.741625	0.904140	0.760180	0.899362
QLT08	0.446562	0.911262	0.481072	0.907751
REL09	0.870270	0.897828	0.857143	0.896349
QTY10	-0.269933	0.935422	-0.270326	0.928330
REL11	0.785921	0.901757	0.775387	0.898893
MAN12	0.880181	0.897655	0.863367	0.896154
QTY13	-0.130418	0.922790	-0.156877	0.925403
QTY13R	-0.002392	0.920302	-0.025388	0.921932
QLT14	0.603600	0.909310	0.631282	0.903288
QLT15	0.757337	0.902876	0.772988	0.898967
MAN16	0.897965	0.896669	0.880100	0.895628

5 'VAR' Variables: P65 P66 P67 P68 P69

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
P65	16	0.18750	1.16726	3.00000	-1.00000	2.00000
P66	16	-0.18750	1.10868	-3.00000	-2.00000	2.00000
P67	16	0.18750	1.10868	3.00000	-2.00000	2.00000
P68	16	0.37500	1.20416	6.00000	-2.00000	2.00000
P69	16	0.62500	1.02470	10.00000	-2.00000	2.00000

Cronbach Coefficient Alpha
for RAW variables : 0.712362
for STANDARDIZED variables: 0.720173

Deleted Variable	Raw Variables Correlation with Total	Raw Variables Alpha	Std. Variables Correlation with Total	Std. Variables Alpha
P65	0.063855	0.816840	0.056534	0.822043
P66	0.368521	0.703761	0.384505	0.709403
P67	0.659012	0.584559	0.666954	0.593995
P68	0.640681	0.586488	0.646806	0.602833
P69	0.742904	0.557854	0.742813	0.559852

Charts and Graphs

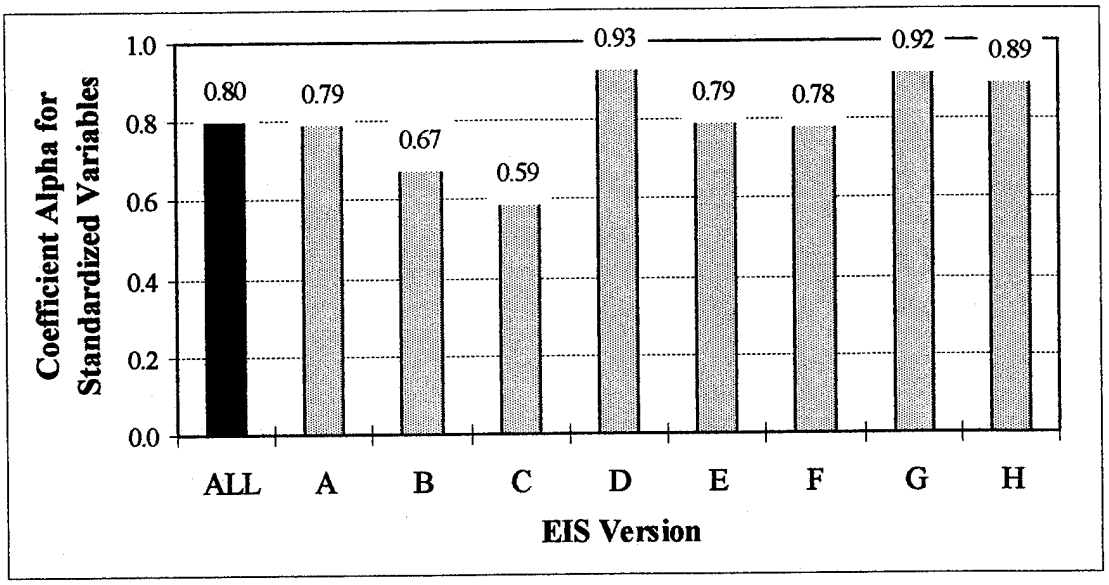

Figure 10. Coefficient Alpha for COHERENCE Construct

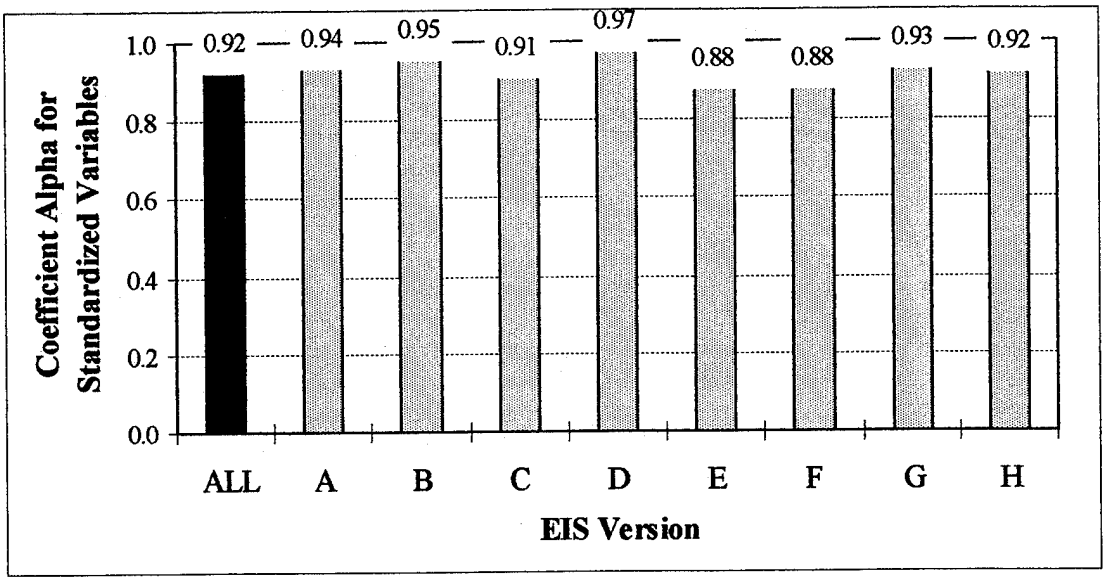

Figure 11. Coefficient Alpha for MANNER Construct

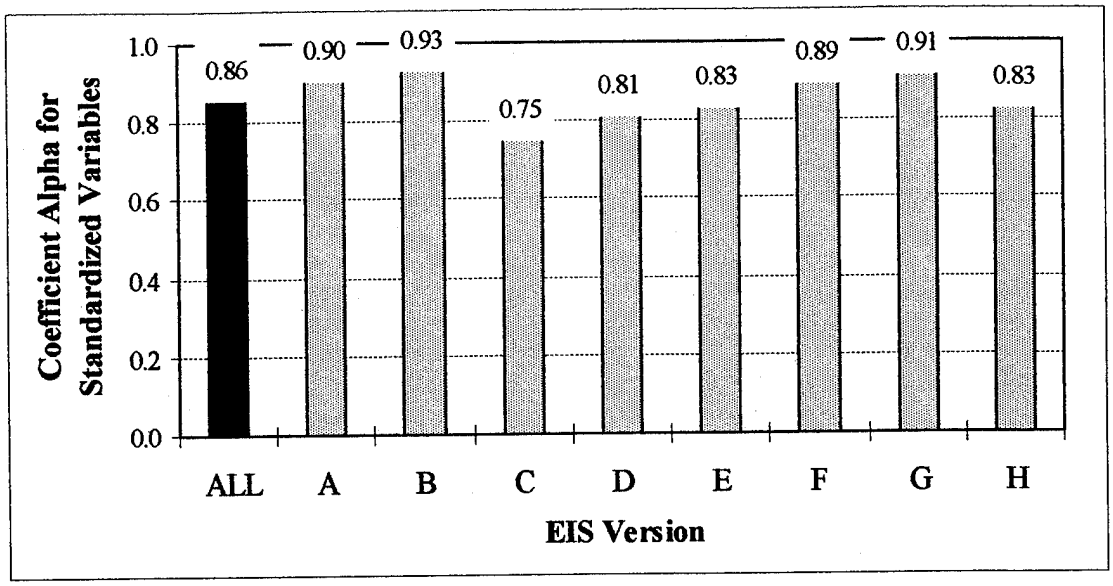

Figure 12. Coefficient Alpha for QUALITY Construct

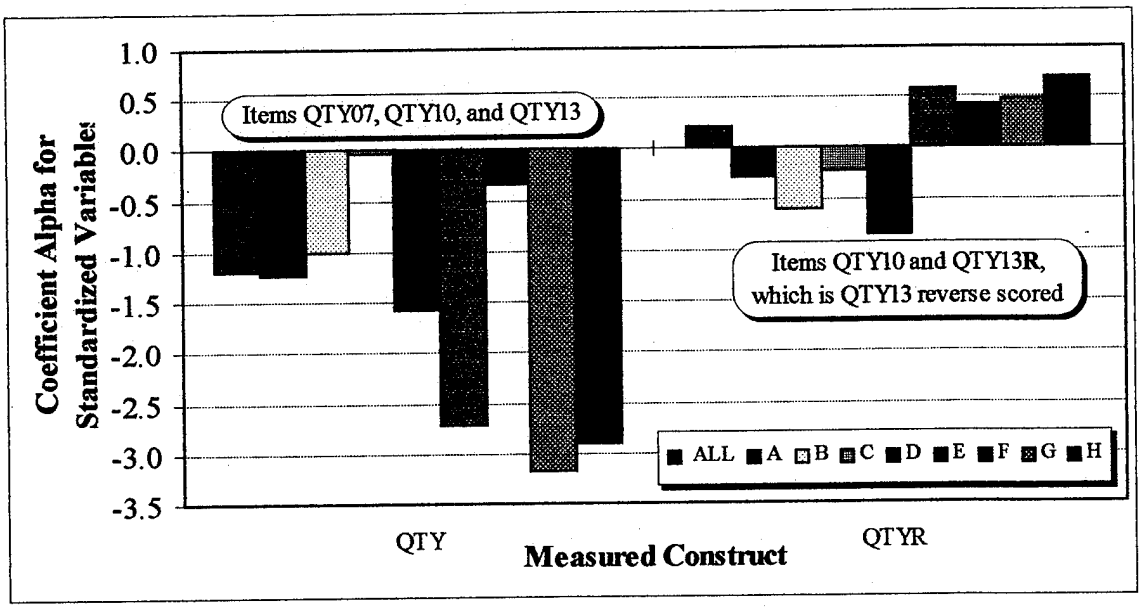

Figure 13. Coefficient Alpha for QUANTITY Construct

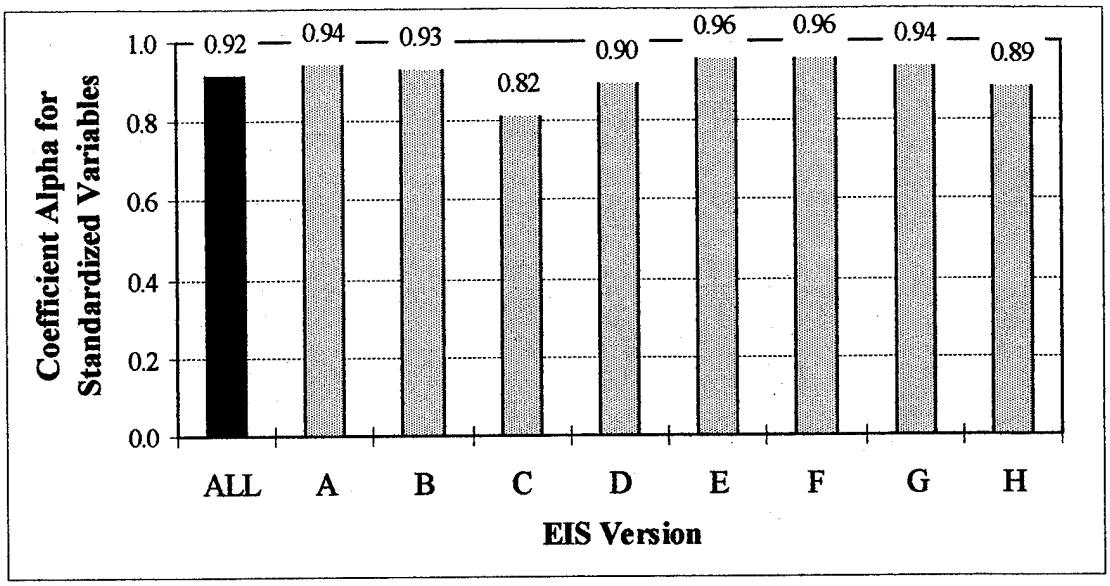

Figure 14. Coefficient Alpha for RELATION Construct

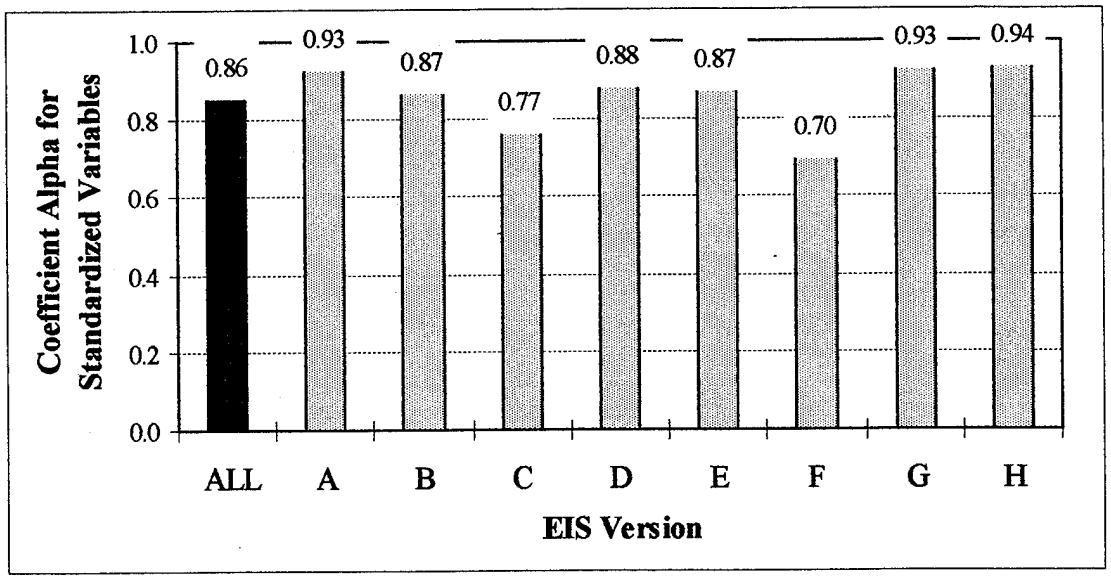

Figure 15. Coefficient Alpha for USABILITY Construct

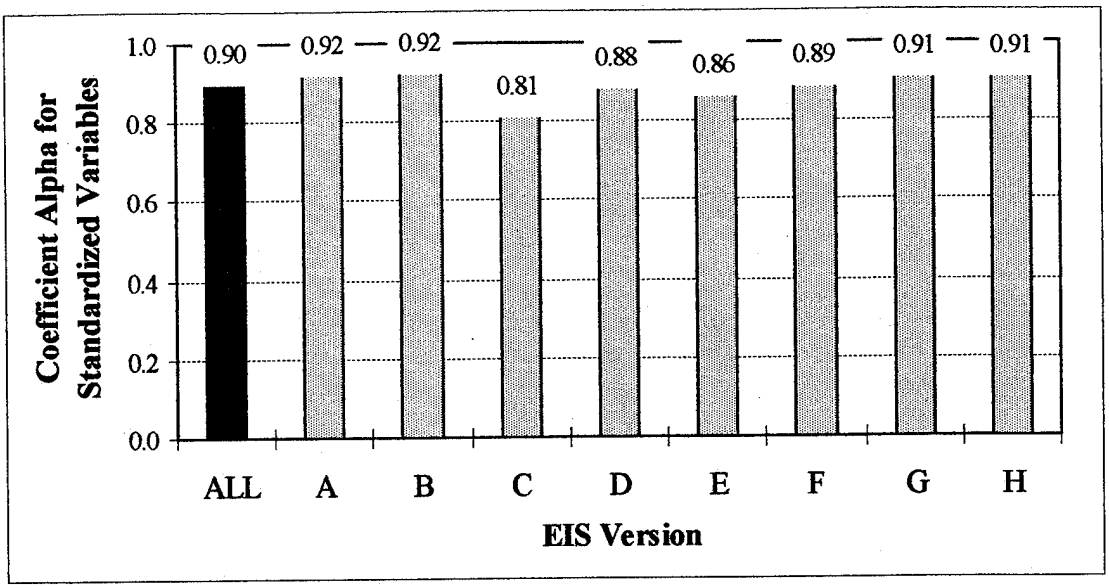

Figure 16. Overall Coefficient Alpha for All Constructs Combined

Appendix D: *Statistix* Files

General Description: This appendix contains the database used by the *Statistix* program and the various resulting outputs. It is divided into the following sections:

Data Files

Raw Data

CASE	SUBJ	GRP	EIS	SECT	VER	CUES	USE01	COH02	COH03	REL04	USE05	MAN06	QTY07	QLT08	REL09	QTY10	REL11	MAN12	QTY13	QTYR	QLT14	QLT15	MAN16
1	6	6	BAFB	EE	A	NOWS	1	1	1	1	1	1	0	0	1	0	1	1	0	-0	0	-1	1
2	14	6	BAFB	EE	A	NOWS	1	1	1	1	1	1	1	0	1	-1	1	1	-1	1	0	1	1
3	22	6	BAFB	EE	A	NOWS	0	1	1	0	-1	1	0	0	0	0	0	-1	0	-0	0	0	0
4	30	6	BAFB	EE	A	NOWS	0	0	1	1	0	1	1	0	0	0	0	0	0	-0	0	0	0
5	7	7	BAFB	PN	A	NOWS	2	1	1	1	1	2	1	1	1	-1	1	1	-1	1	1	1	1
6	15	7	BAFB	PN	A	NOWS	1	1	1	1	1	1	1	1	1	-1	0	1	-1	1	1	1	1
7	23	7	BAFB	PN	A	NOWS	2	2	2	2	2	2	2	2	2	-1	2	2	-1	1	2	2	2
8	31	7	BAFB	PN	A	NOWS	2	2	1	1	2	2	1	1	2	-2	1	1	-2	2	1	1	2
9	8	8	DRP	EE	A	NOWS	-2	0	0	0	0	0	1	0	0	1	0	0	-2	2	0	0	0
10	16	8	DRP	EE	A	NOWS	0	-1	1	-1	1	0	-1	0	-1	1	0	1	-1	1	0	0	-1
11	24	8	DRP	EE	A	NOWS	0	-1	1	0	0	-1	-1	0	-1	1	-1	-1	-1	1	0	-1	0
12	32	8	DRP	EE	A	NOWS	-2	-2	-2	-2	-2	-2	-2	0	-2	1	-1	-1	-1	1	0	0	-2
13	1	1	DRP	PN	A	NOWS	2	2	2	2	2	2	2	0	1	-1	1	1	-1	1	2	1	2
14	9	1	DRP	PN	A	NOWS	-1	-1	-1	-2	-1	-2	-2	0	-2	1	-2	-1	-1	1	0	0	-2
15	17	1	DRP	PN	A	NOWS	-1	-2	1	1	-1	-1	1	0	-1	1	-1	-1	-1	1	0	0	-1
16	7	7	BAFB	EE	B	NOTY	-1	0	1	1	-1	0	1	0	0	0	1	1	-1	1	0	0	0
17	15	7	BAFB	EE	B	NOTY	1	1	1	1	1	1	1	1	1	-1	1	1	-1	1	1	1	1
18	23	7	BAFB	EE	B	NOTY	2	2	2	2	2	2	2	2	2	-1	2	2	-1	1	2	2	2
19	31	7	BAFB	EE	B	NOTY	1	1	1	2	2	1	2	1	1	-2	1	1	0	-0	0	0	1
20	8	8	BAFB	PN	B	NOTY	1	1	0	1	1	1	1	1	1	-1	1	1	-1	1	1	1	1
21	16	8	BAFB	PN	B	NOTY	1	1	1	1	1	1	-1	0	0	-1	0	1	-1	1	0	0	1
22	24	8	BAFB	PN	B	NOTY	0	0	1	-1	-1	-1	-1	0	-1	-1	-1	-1	-1	1	-1	-2	-1
23	32	8	BAFB	PN	B	NOTY	2	2	2	2	2	2	2	0	2	0	2	2	0	-0	0	0	2
24	1	1	DRP	EE	B	NOTY	-1	-1	-1	-2	-1	-1	-1	0	-1	-1	-1	-1	1	-1	0	-1	-1
25	9	1	DRP	EE	B	NOTY	0	0	1	0	0	1	-1	0	-1	1	0	0	0	-0	0	0	1
26	17	1	DRP	EE	B	NOTY	-1	-1	1	-1	-1	-1	-1	0	-1	1	-1	-1	-1	1	0	-1	-1
27	2	2	DRP	PN	B	NOTY	-1	-1	-1	-1	-1	-1	0	0	-1	-1	-1	-1	1	-1	0	-1	-1
28	10	2	DRP	PN	B	NOTY	1	0	0	-1	1	1	0	0	1	-1	0	0	-1	1	0	0	1
29	18	2	DRP	PN	B	NOTY	1	1	1	1	1	1	1	0	-1	1	-1	1	-1	1	0	1	1
30	26	2	DRP	PN	B	NOTY	1	-2	1	-2	-2	0	-2	0	-2	2	-1	-2	2	-2	0	-1	-2
31	8	8	BAFB	EE	C	NOTS	0	1	0	0	0	0	1	1	1	0	1	1	-2	2	1	1	1
32	16	8	BAFB	EE	C	NOTS	-1	-1	1	1	-1	1	1	-1	0	-1	-1	1	-1	1	0	0	1
33	24	8	BAFB	EE	C	NOTS	1	-1	1	0	0	-1	-1	-1	-1	0	-1	0	0	-0	-1	-1	-1
34	32	8	BAFB	EE	C	NOTS	2	2	2	2	2	2	2	0	2	0	2	2	0	-0	0	0	2
35	1	1	BAFB	PN	C	NOTS	1	1	1	1	1	1	1	0	1	-1	1	1	-1	1	0	1	1
36	9	1	BAFB	PN	C	NOTS	1	1	1	1	1	1	1	0	1	0	1	1	0	-0	0	0	1
37	17	1	BAFB	PN	C	NOTS	1	1	1	1	1	1	1	0	1	-1	1	1	1	-1	0	-1	1
38	2	2	DRP	EE	C	NOTS	-1	1	1	-1	-1	0	-1	0	0	-1	0	1	0	-0	0	0	1
39	10	2	DRP	EE	C	NOTS	1	0	-1	-2	0	1	0	0	-1	2	-1	0	-1	1	0	1	0
40	18	2	DRP	EE	C	NOTS	-1	-1	1	-1	-1	1	1	0	-1	2	-1	-1	-1	1	0	1	-1
41	26	2	DRP	EE	C	NOTS	1	-1	-2	-2	-2	-1	0	0	-2	2	0	-2	0	-0	0	0	-2
42	3	3	DRP	PN	C	NOTS	2	1	1	1	1	1	1	0	1	-1	1	1	-1	1	0	1	1
43	11	3	DRP	PN	C	NOTS	1	1	1	1	-1	-1	-1	0	-1	-1	-1	0	-1	1	1	1	-1
44	27	3	DRP	PN	C	NOTS	-1	-1	1	1	-1	-1	1	0	-1	-1	-1	-1	-1	1	0	0	-1
45	1	1	BAFB	EE	D	NOSY	1	1	1	1	1	1	1	0	1	-1	1	1	-1	1	0	1	1
46	9	1	BAFB	EE	D	NOSY	0	1	1	1	0	1	0	0	1	1	0	1	0	-0	0	0	1
47	17	1	BAFB	EE	D	NOSY	1	1	1	1	1	1	1	0	1	-1	1	1	-1	1	1	1	1
48	2	2	BAFB	PN	D	NOSY	2	1	1	1	2	1	1	0	1	0	1	1	-1	1	0	0	1
49	10	2	BAFB	PN	D	NOSY	1	1	1	2	1	2	0	0	1	-1	1	1	-1	1	0	1	1
50	18	2	BAFB	PN	D	NOSY	1	2	1	1	1	1	1	0	-1	-1	-1	1	-1	1	0	-1	1
51	26	2	BAFB	PN	D	NOSY	1	1	1	0	-1	-1	-1	0	-1	0	0	-1	0	-0	0	0	-1
52	3	3	DRP	EE	D	NOSY	1	1	1	1	1	1	1	0	1	1	1	1	-1	1	0	-1	1
53	11	3	DRP	EE	D	NOSY	-1	-1	-1	1	-1	-1	-1	0	1	1	-1	0	-1	1	0	1	-1
54	27	3	DRP	EE	D	NOSY	1	-1	-1	-1	-1	-1	0	0	-1	-1	-1	-1	-1	1	0	0	-1
55	4	4	DRP	PN	D	NOSY	-1	-2	0	-1	-1	-1	0	-1	-2	1	-1	-1	-1	1	0	-1	-2

56	12	4	DRP	PN	D	NOSY	1	2	2	1	1	1	1	1	1	0	1	1	-1	1	1	1	1
57	20	4	DRP	PN	D	NOSY	-1	-1	0	0	-1	0	-1	1	-1	2	0	-1	-1	1	1	1	-1
58	28	4	DRP	PN	D	NOSY	-1	-1	-1	-1	-2	-1	-1	0	-1	1	-1	-1	1	-1	0	0	-1
59	2	2	BAFB	EE	E	LING	1	1	1	1	2	2	0	0	1	-1	1	1	0	-0	0	0	1
60	10	2	BAFB	EE	E	LING	1	1	1	2	2	1	0	0	2	-1	2	1	-1	1	0	1	2
61	18	2	BAFB	EE	E	LING	1	1	1	1	1	1	1	0	1	-1	-1	1	-1	1	0	-1	1
62	26	2	BAFB	EE	E	LING	-2	-2	-1	0	-2	-1	0	0	-1	0	0	0	0	-0	0	1	-1
63	3	3	BAFB	PN	E	LING	1	1	1	1	0	1	0	0	1	-1	0	0	2	-2	1	1	1
64	11	3	BAFB	PN	E	LING	1	-1	-1	-2	-1	-1	-1	0	-2	1	-2	-1	-2	2	0	-1	-1
65	27	3	BAFB	PN	E	LING	1	1	1	1	1	1	0	0	1	-1	1	1	-1	1	0	0	1
66	4	4	DRP	EE	E	LING	-1	-1	1	0	-1	2	-1	0	-1	1	-1	-1	0	-0	1	1	-1
67	12	4	DRP	EE	E	LING	1	1	1	1	1	1	1	2	1	-1	1	0	-1	1	1	1	1
68	20	4	DRP	EE	E	LING	1	0	1	-1	0	-1	1	1	-1	2	-1	-1	-2	2	1	1	-1
69	28	4	DRP	EE	E	LING	-1	-1	-1	-1	-1	-1	-1	0	-1	1	-1	-1	-1	1	0	1	-1
70	5	5	DRP	PN	E	LING	1	0	2	1	1	1	1	0	1	-1	0	1	-1	1	0	0	1
71	13	5	DRP	PN	E	LING	0	-1	0	-1	-1	-1	-1	-1	-2	0	-2	0	1	-1	-1	-1	-1
72	21	5	DRP	PN	E	LING	0	0	1	-1	-1	0	-1	0	-1	0	-1	0	-1	1	0	0	-1
73	29	5	DRP	PN	E	LING	-1	-1	1	-1	-1	-1	0	0	-1	-1	-1	-1	1	-1	0	0	-1
74	3	3	BAFB	EE	F	VIS	-1	-1	1	1	1	1	0	0	0	0	1	1	0	-0	0	-1	1
75	11	3	BAFB	EE	F	VIS	2	1	1	1	2	2	1	1	1	-1	1	1	-1	1	0	1	2
76	27	3	BAFB	EE	F	VIS	1	1	1	1	1	1	0	0	1	0	1	1	0	-0	0	0	1
77	4	4	BAFB	PN	F	VIS	0	1	1	1	1	0	1	1	1	0	1	0	0	-0	1	1	1
78	12	4	BAFB	PN	F	VIS	2	2	2	1	1	2	2	2	1	-1	1	2	2	-2	1	2	1
79	20	4	BAFB	PN	F	VIS	2	0	1	0	0	-1	0	1	-1	1	0	1	-1	1	1	1	-1
80	28	4	BAFB	PN	F	VIS	1	1	1	1	1	1	1	0	1	-1	1	1	-1	1	0	1	1
81	5	5	DRP	EE	F	VIS	-1	-1	1	-1	-1	1	-2	0	-1	0	-2	-1	-1	1	0	-1	0
82	13	5	DRP	EE	F	VIS	-1	-1	-1	0	-1	1	0	0	0	1	0	0	-1	1	0	1	0
83	21	5	DRP	EE	F	VIS	-1	-1	0	-1	0	0	0	0	-1	1	-1	-1	-1	1	0	0	0
84	29	5	DRP	EE	F	VIS	-2	-1	-2	-1	-2	-1	0	0	-1	1	-1	-1	1	-1	0	0	-1
85	6	6	DRP	PN	F	VIS	1	1	1	0	-1	0	0	0	1	-1	1	0	1	-1	0	-1	1
86	14	6	DRP	PN	F	VIS	1	1	0	0	0	0	1	0	0	-1	0	0	-1	1	0	0	0
87	22	6	DRP	PN	F	VIS	1	0	1	0	-1	-1	1	0	0	1	0	-1	-1	1	0	0	-1
88	30	6	DRP	PN	F	VIS	0	-1	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	0	-0	0	0	-1
89	4	4	BAFB	EE	G	ALL	0	0	1	0	0	1	0	0	0	0	0	1	0	-0	-1	0	0
90	12	4	BAFB	EE	G	ALL	1	2	2	2	2	1	2	1	1	-1	1	2	-1	1	1	1	2
91	20	4	BAFB	EE	G	ALL	-1	-1	-1	-1	-2	1	1	1	-1	1	0	-1	-1	1	1	1	-1
92	28	4	BAFB	EE	G	ALL	1	1	1	1	1	1	0	0	1	-1	1	1	-1	1	0	1	1
93	5	5	BAFB	PN	G	ALL	1	1	1	1	1	1	1	0	1	-1	1	1	-1	1	0	0	1
94	13	5	BAFB	PN	G	ALL	1	1	1	0	1	1	0	0	0	-1	0	0	-1	1	0	1	1
95	21	5	BAFB	PN	G	ALL	1	1	1	1	1	1	1	0	1	-1	1	1	-1	1	0	1	1
96	29	5	BAFB	PN	G	ALL	1	1	1	1	1	1	0	0	1	-1	1	1	-1	1	0	0	1
97	6	6	DRP	EE	G	ALL	-1	-1	-1	1	-2	-1	0	0	1	0	1	-1	0	-0	0	1	-1
98	14	6	DRP	EE	G	ALL	-1	-1	-1	-2	-1	-1	-1	-1	-1	1	-1	-1	-1	1	-1	0	-1
99	22	6	DRP	EE	G	ALL	-1	-2	0	-1	-1	0	-1	0	-1	-1	-1	-1	0	-0	-1	-1	-1
100	30	6	DRP	EE	G	ALL	-1	0	1	1	-1	0	0	0	0	1	-1	0	-1	1	0	0	0
101	7	7	DRP	PN	G	ALL	2	1	1	1	2	1	1	0	1	-1	1	1	-1	1	0	0	1
102	15	7	DRP	PN	G	ALL	-1	0	1	0	-1	0	-1	0	0	1	-1	0	-1	1	0	0	-1
103	23	7	DRP	PN	G	ALL	2	2	2	2	2	2	2	2	2	-1	2	2	-1	1	2	2	2
104	31	7	DRP	PN	G	ALL	1	1	1	0	1	2	-1	0	1	-2	1	1	1	-1	0	0	1
105	5	5	BAFB	EE	H	NONE	-1	2	1	1	-1	1	0	0	1	0	1	1	0	-0	0	0	1
106	13	5	BAFB	EE	H	NONE	1	1	1	1	1	1	0	0	1	-2	0	1	0	-0	0	0	1
107	21	5	BAFB	EE	H	NONE	1	-1	0	-1	1	-1	0	0	-1	-1	-1	-1	-1	1	0	0	-1
108	29	5	BAFB	EE	H	NONE	0	1	1	1	1	1	0	0	1	0	1	1	-1	1	0	0	1
109	6	6	BAFB	PN	H	NONE	2	2	2	2	2	2	0	0	1	0	1	2	0	-0	0	1	2
110	14	6	BAFB	PN	H	NONE	0	0	1	1	0	0	0	0	0	-1	0	0	-1	1	0	1	1
111	22	6	BAFB	PN	H	NONE	0	1	1	0	-1	-1	0	0	0	0	-1	-1	0	-0	0	0	-1
112	30	6	BAFB	PN	H	NONE	0	0	0	0	0	0	0	0	0	0	0	1	-1	1	0	0	0
113	7	7	DRP	EE	H	NONE	1	-1	0	0	0	1	1	0	0	1	0	0	-1	1	0	1	0
114	15	7	DRP	EE	H	NONE	0	0	1	1	0	-1	-1	0	0	2	-1	-1	-1	1	0	0	0
115	23	7	DRP	EE	H	NONE	2	2	2	2	2	2	2	2	2	-1	2	2	-1	1	2	2	2
116	31	7	DRP	EE	H	NONE	-1	-1	0	0	-1	1	-1	0	-1	-1	-1	-1	0	-0	0	0	-2
117	8	8	DRP	PN	H	NONE	0	0	0	0	0	0	0	0	1	1	0	0	-2	2	0	0	0
118	16	8	DRP	PN	H	NONE	1	-1	1	1	0	0	0	1	0	2	-1	0	-2	2	0	0	0
119	24	8	DRP	PN	H	NONE	-1	-1	0	-1	-1	0	-1	-1	-2	1	0	-1	-1	1	0	-2	-1
120	32	8	DRP	PN	H	NONE	-1	-1	0	-1	-1	-1	-1	1	-2	0	-1	-1	0	-0	0	-1	-1

Summated Data and Ranked Summated Data

CASE	SUBJ	GRP	EIS	SECT	VER	CUES	COHERENC	USEABLTY	MAANER	RELATION	QUALITY	COHRANK	USERANK	MANRANK	RELRANK	QLTRANK
1	6	6	BAFB	EE	A	NOWS	2	2	3	3	-1	85	86	87	93	16
2	14	6	BAFB	EE	A	NOWS	2	2	3	3	1	85	86	87	93	84
3	22	6	BAFB	EE	A	NOWS	2	-1	0	0	0	85	37	48	55	48
4	30	6	BAFB	EE	A	NOWS	1	0	1	1	0	55	51	57	65	48
5	7	7	BAFB	PN	A	NOWS	2	3	4	3	3	85	105	106	93	108
6	15	7	BAFB	PN	A	NOWS	2	2	3	2	3	85	86	87	73	108
7	23	7	BAFB	PN	A	NOWS	4	4	6	6	6	115	115	117	117	119
8	31	7	BAFB	PN	A	NOWS	3	4	5	4	3	108	115	111	111	108
9	8	8	DRP	EE	A	NOWS	0	-2	0	0	0	39	20	48	55	48
10	16	8	DRP	EE	A	NOWS	0	1	0	-2	0	39	65	48	32	48
11	24	8	DRP	EE	A	NOWS	0	0	-2	-2	-1	39	51	32	32	16
12	32	8	DRP	EE	A	NOWS	-4	-4	-5	-5	0	1	2	2	4	48
13	1	1	DRP	PN	A	NOWS	4	4	5	4	3	115	115	111	111	108
14	9	1	DRP	PN	A	NOWS	-2	-2	-5	-6	0	12	20	2	2	48
15	17	1	DRP	PN	A	NOWS	-1	-2	-3	-1	0	25	20	16	41	48
16	7	7	BAFB	EE	B	NOTY	1	-2	1	2	0	55	20	57	73	48
17	15	7	BAFB	EE	B	NOTY	2	2	3	3	3	85	86	87	93	108
18	23	7	BAFB	EE	B	NOTY	4	4	6	6	6	115	115	117	117	119
19	31	7	BAFB	EE	B	NOTY	2	3	3	4	1	85	105	87	111	84
20	8	8	BAFB	PN	B	NOTY	1	2	3	3	3	55	86	87	93	108
21	16	8	BAFB	PN	B	NOTY	2	2	3	1	0	85	86	87	65	48
22	24	8	BAFB	PN	B	NOTY	1	-1	-3	-3	-3	55	37	16	21	3
23	32	8	BAFB	PN	B	NOTY	4	4	6	6	0	115	115	117	117	48
24	1	1	DRP	EE	B	NOTY	-2	-2	-3	-4	-1	12	20	16	9	16
25	9	1	DRP	EE	B	NOTY	1	0	2	-1	0	55	51	66	41	48
26	17	1	DRP	EE	B	NOTY	0	-2	-3	-3	-1	39	20	16	21	16
27	2	2	DRP	PN	B	NOTY	-2	-2	-3	-3	-1	12	20	16	21	16
28	10	2	DRP	PN	B	NOTY	0	2	2	0	0	39	86	66	55	48
29	18	2	DRP	PN	B	NOTY	2	2	3	-1	1	85	86	87	41	84
30	26	2	DRP	PN	B	NOTY	-1	-1	-4	-5	-1	25	37	5	4	16
31	8	8	BAFB	EE	C	NOTS	1	0	2	2	3	55	51	66	73	108
32	16	8	BAFB	EE	C	NOTS	0	-2	3	0	-1	39	20	87	55	16
33	24	8	BAFB	EE	C	NOTS	0	1	-2	-2	-3	39	65	32	32	3
34	32	8	BAFB	EE	C	NOTS	4	4	6	6	0	115	115	117	117	48
35	1	1	BAFB	PN	C	NOTS	2	2	3	3	1	85	86	87	93	84
36	9	1	BAFB	PN	C	NOTS	2	2	3	3	0	85	86	87	93	48
37	17	1	BAFB	PN	C	NOTS	2	2	3	3	-1	85	86	87	93	16
38	2	2	DRP	EE	C	NOTS	2	-2	2	-1	0	85	20	66	41	48
39	10	2	DRP	EE	C	NOTS	-1	1	1	-4	1	25	65	57	9	84
40	18	2	DRP	EE	C	NOTS	0	-2	-1	-3	1	39	20	41	21	84
41	26	2	DRP	EE	C	NOTS	-3	-1	-5	-4	0	3	37	2	9	48
42	3	3	DRP	PN	C	NOTS	2	3	3	3	1	85	105	87	93	84
43	11	3	DRP	PN	C	NOTS	2	0	-2	-1	2	85	51	32	41	98
44	27	3	DRP	PN	C	NOTS	0	-2	-3	-1	0	39	20	16	41	48
45	1	1	BAFB	EE	D	NOSY	2	2	3	3	1	85	86	87	93	84
46	9	1	BAFB	EE	D	NOSY	2	0	3	2	0	85	51	87	73	48
47	17	1	BAFB	EE	D	NOSY	2	2	3	3	2	85	86	87	93	98
48	2	2	BAFB	PN	D	NOSY	2	4	3	3	0	85	115	87	93	48
49	10	2	BAFB	PN	D	NOSY	2	2	4	4	1	85	86	106	111	84
50	18	2	BAFB	PN	D	NOSY	3	2	3	-1	-1	108	86	87	41	16
51	26	2	BAFB	PN	D	NOSY	2	0	-3	-1	0	85	51	16	41	48
52	3	3	DRP	EE	D	NOSY	2	2	3	3	-1	85	86	87	93	16
53	11	3	DRP	EE	D	NOSY	-2	-2	-2	1	1	12	20	32	65	84
54	27	3	DRP	EE	D	NOSY	-2	0	-3	-3	0	12	51	16	21	48
55	4	4	DRP	PN	D	NOSY	-2	-2	-4	-4	-2	12	20	5	9	6

56	12	4	DRP	PN	D	NOSY	4	2	3	3	3	115	86	87	93	108
57	20	4	DRP	PN	D	NOSY	-1	-2	-2	-1	3	25	20	32	41	108
58	28	4	DRP	PN	D	NOSY	-2	-3	-3	-3	0	12	5	16	21	48
59	2	2	BAFB	EE	E	LING	2	3	4	3	0	85	105	106	93	48
60	10	2	BAFB	EE	E	LING	2	3	4	6	1	85	105	106	117	84
61	18	2	BAFB	EE	E	LING	2	2	3	1	-1	85	86	87	65	16
62	26	2	BAFB	EE	E	LING	-3	-4	-2	-1	1	3	2	32	41	84
63	3	3	BAFB	PN	E	LING	2	1	2	2	2	85	65	66	73	98
64	11	3	BAFB	PN	E	LING	-2	0	-3	-6	-1	12	51	16	2	16
65	27	3	BAFB	PN	E	LING	2	2	3	3	0	85	86	87	93	48
66	4	4	DRP	EE	E	LING	0	-2	0	-2	2	39	20	48	32	98
67	12	4	DRP	EE	E	LING	2	2	2	3	4	85	86	66	93	115
68	20	4	DRP	EE	E	LING	1	1	-3	-3	3	55	65	16	21	108
69	28	4	DRP	EE	E	LING	-2	-2	-3	-3	1	12	20	16	21	84
70	5	5	DRP	PN	E	LING	2	2	3	2	0	85	86	87	73	48
71	13	5	DRP	PN	E	LING	-1	-1	-2	-5	-3	25	37	32	4	3
72	21	5	DRP	PN	E	LING	1	-1	-1	-3	0	55	37	41	21	48
73	29	5	DRP	PN	E	LING	0	-2	-3	-3	0	39	20	16	21	48
74	3	3	BAFB	EE	F	VIS	0	0	3	2	-1	39	51	87	73	16
75	11	3	BAFB	EE	F	VIS	2	4	5	3	2	85	115	111	93	98
76	27	3	BAFB	EE	F	VIS	2	2	3	3	0	85	86	87	93	48
77	4	4	BAFB	PN	F	VIS	2	1	1	3	3	85	65	57	93	108
78	12	4	BAFB	PN	F	VIS	4	3	5	3	5	115	105	111	93	116
79	20	4	BAFB	PN	F	VIS	1	2	-1	-1	3	55	86	41	41	108
80	28	4	BAFB	PN	F	VIS	2	2	3	3	1	85	86	87	93	84
81	5	5	DRP	EE	F	VIS	0	-2	0	-4	-1	39	20	48	9	16
82	13	5	DRP	EE	F	VIS	-2	-2	1	0	1	12	20	57	55	84
83	21	5	DRP	EE	F	VIS	-1	-1	-1	-3	0	25	37	41	21	48
84	29	5	DRP	EE	F	VIS	-3	-4	-3	-3	0	3	2	16	21	48
85	6	6	DRP	PN	F	VIS	2	0	1	2	-1	85	51	57	73	16
86	14	6	DRP	PN	F	VIS	1	1	0	0	0	55	65	48	55	48
87	22	6	DRP	PN	F	VIS	1	0	-3	0	0	55	51	16	55	48
88	30	6	DRP	PN	F	VIS	-2	-1	-3	-3	0	12	37	16	21	48
89	4	4	BAFB	EE	G	ALL	1	0	2	0	-1	55	51	66	55	16
90	12	4	BAFB	EE	G	ALL	4	3	5	4	3	115	105	111	111	108
91	20	4	BAFB	EE	G	ALL	-2	-3	-1	-2	3	12	5	41	32	108
92	28	4	BAFB	EE	G	ALL	2	2	3	3	1	85	86	87	93	84
93	5	5	BAFB	PN	G	ALL	2	2	3	3	0	85	86	87	93	48
94	13	5	BAFB	PN	G	ALL	2	2	2	0	1	85	86	66	55	84
95	21	5	BAFB	PN	G	ALL	2	2	3	3	1	85	86	87	93	84
96	29	5	BAFB	PN	G	ALL	2	2	3	3	0	85	86	87	93	48
97	6	6	DRP	EE	G	ALL	-2	-3	-3	3	1	12	5	16	93	84
98	14	6	DRP	EE	G	ALL	-2	-2	-3	-4	-2	12	20	16	9	6
99	22	6	DRP	EE	G	ALL	-2	-2	-2	-3	-2	12	20	32	21	6
100	30	6	DRP	EE	G	ALL	1	0	0	0	0	55	51	48	55	48
101	7	7	DRP	PN	G	ALL	2	4	3	3	0	85	115	87	93	48
102	15	7	DRP	PN	G	ALL	1	-2	-1	-1	0	55	20	41	41	48
103	23	7	DRP	PN	G	ALL	4	4	6	6	6	115	115	117	117	119
104	31	7	DRP	PN	G	ALL	2	2	4	2	0	85	86	106	73	48
105	5	5	BAFB	EE	H	NONE	3	-2	3	3	0	108	20	87	93	48
106	13	5	BAFB	EE	H	NONE	2	2	3	2	0	85	86	87	73	48
107	21	5	BAFB	EE	H	NONE	-1	2	-3	-3	0	25	86	16	21	48
108	29	5	BAFB	EE	H	NONE	2	1	3	3	0	85	65	87	93	48
109	6	6	BAFB	PN	H	NONE	4	4	6	4	1	115	115	117	111	84
110	14	6	BAFB	PN	H	NONE	1	0	1	1	1	55	51	57	65	84
111	22	6	BAFB	PN	H	NONE	2	-1	-3	-1	0	85	37	16	41	48
112	30	6	BAFB	PN	H	NONE	0	0	1	0	0	39	51	57	55	48
113	7	7	DRP	EE	H	NONE	-1	1	1	0	1	25	65	57	55	84
114	15	7	DRP	EE	H	NONE	1	0	-2	0	0	55	51	32	55	48
115	23	7	DRP	EE	H	NONE	4	4	6	6	6	115	115	117	117	119
116	31	7	DRP	EE	H	NONE	-1	-2	-2	-2	0	25	20	32	32	48
117	8	8	DRP	PN	H	NONE	0	0	0	1	0	39	51	48	65	48
118	16	8	DRP	PN	H	NONE	0	1	0	0	1	39	65	48	55	84
119	24	8	DRP	PN	H	NONE	-1	-2	-2	-3	-3	25	20	32	21	3
120	32	8	DRP	PN	H	NONE	-1	-2	-3	-4	0	25	20	16	9	48

Descriptive Statistics - Summated Constructs

DESCRIPTIVE STATISTICS FOR CUES = ALL (Both Linguistic and Visual Cues are Cohesive)

	COHERENC	USABLTY	MANNER	RELATION	QUALITY
N	16	16	16	16	16
MEAN	1.0625	0.6875	1.5000	1.2500	0.6875
SD	2.0156	2.4144	2.8048	2.7689	1.9906
MINIMUM	-2.0000	-3.0000	-3.0000	-4.0000	-2.0000
MEDIAN	2.0000	2.0000	2.5000	2.5000	0.0000
MAXIMUM	4.0000	4.0000	6.0000	6.0000	6.0000

DESCRIPTIVE STATISTICS FOR CUES = LING (Only Linguistic Cues are Cohesive)

	COHERENC	USABLTY	MANNER	RELATION	QUALITY
N	15	15	15	15	15
MEAN	0.5333	0.2667	0.2667	-0.4000	0.6000
SD	1.7674	2.1536	2.8149	3.5010	1.7238
MINIMUM	-3.0000	-4.0000	-3.0000	-6.0000	-3.0000
MEDIAN	1.0000	1.0000	0.0000	-1.0000	0.0000
MAXIMUM	2.0000	3.0000	4.0000	6.0000	4.0000

DESCRIPTIVE STATISTICS FOR CUES = NONE (Neither Linguistic Nor Visual Cues are Cohesive)

	COHERENC	USABLTY	MANNER	RELATION	QUALITY
N	16	16	16	16	16
MEAN	0.8750	0.3750	0.5625	0.4375	0.4375
SD	1.7842	1.9621	3.0104	2.7318	1.7500
MINIMUM	-1.0000	-2.0000	-3.0000	-4.0000	-3.0000
MEDIAN	0.5000	0.0000	0.5000	0.0000	0.0000
MAXIMUM	4.0000	4.0000	6.0000	6.0000	6.0000

DESCRIPTIVE STATISTICS FOR CUES = NOSY (Syntax Cues are Non-cohesive)

	COHERENC	USABLTY	MANNER	RELATION	QUALITY
N	14	14	14	14	14
MEAN	0.8571	0.5000	0.5714	0.6429	0.5000
SD	2.1432	2.1031	3.1062	2.7346	1.4544
MINIMUM	-2.0000	-3.0000	-4.0000	-4.0000	-2.0000
MEDIAN	2.0000	1.0000	3.0000	1.5000	0.0000
MAXIMUM	4.0000	4.0000	4.0000	4.0000	3.0000

DESCRIPTIVE STATISTICS FOR CUES = NOTS (Tense Cues are Non-cohesive)

	COHERENC	USABLTY	MANNER	RELATION	QUALITY
N	14	14	14	14	14
MEAN	0.9286	0.4286	0.9286	0.2857	0.2857
SD	1.7305	2.0273	3.0500	3.0742	1.4373
MINIMUM	-3.0000	-2.0000	-5.0000	-4.0000	-3.0000
MEDIAN	1.5000	0.5000	2.0000	-0.5000	0.0000
MAXIMUM	4.0000	4.0000	6.0000	6.0000	3.0000

DESCRIPTIVE STATISTICS FOR CUES = NOTY (Typographic Cues are Non-cohesive)

	COHERENC	USABLTY	MANNER	RELATION	QUALITY
N	15	15	15	15	15
MEAN	1.0000	0.7333	1.0667	0.3333	0.4667
SD	1.8127	2.2509	3.3905	3.5790	2.1668
MINIMUM	-2.0000	-2.0000	-4.0000	-5.0000	-3.0000
MEDIAN	1.0000	2.0000	2.0000	0.0000	0.0000
MAXIMUM	4.0000	4.0000	6.0000	6.0000	6.0000

DESCRIPTIVE STATISTICS FOR CUES = NOWS (White Space Cues are Non-cohesive)

	COHERENC	USABLTY	MANNER	RELATION	QUALITY
N	15	15	15	15	15
MEAN	1.0000	0.7333	1.0000	0.6667	1.1333
SD	2.2039	2.5486	3.5657	3.4157	1.9952
MINIMUM	-4.0000	-4.0000	-5.0000	-6.0000	-1.0000
MEDIAN	2.0000	1.0000	1.0000	1.0000	0.0000
MAXIMUM	4.0000	4.0000	6.0000	6.0000	6.0000

DESCRIPTIVE STATISTICS FOR CUES = VIS (Only Visual Cues are Cohesive)

	COHERENC	USABLTY	MANNER	RELATION	QUALITY
N	15	15	15	15	15
MEAN	0.6000	0.3333	0.7333	0.3333	0.8000
SD	1.9198	2.1269	2.6851	2.6095	1.7403
MINIMUM	-3.0000	-4.0000	-3.0000	-4.0000	-1.0000
MEDIAN	1.0000	0.0000	1.0000	0.0000	0.0000
MAXIMUM	4.0000	4.0000	5.0000	3.0000	5.0000

Histograms

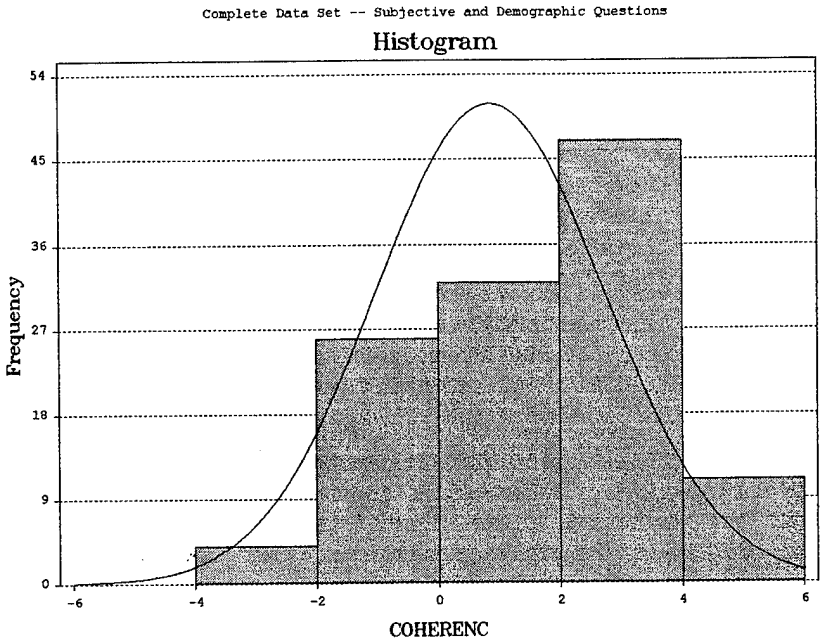

Figure 17. Histogram: COHERENCE

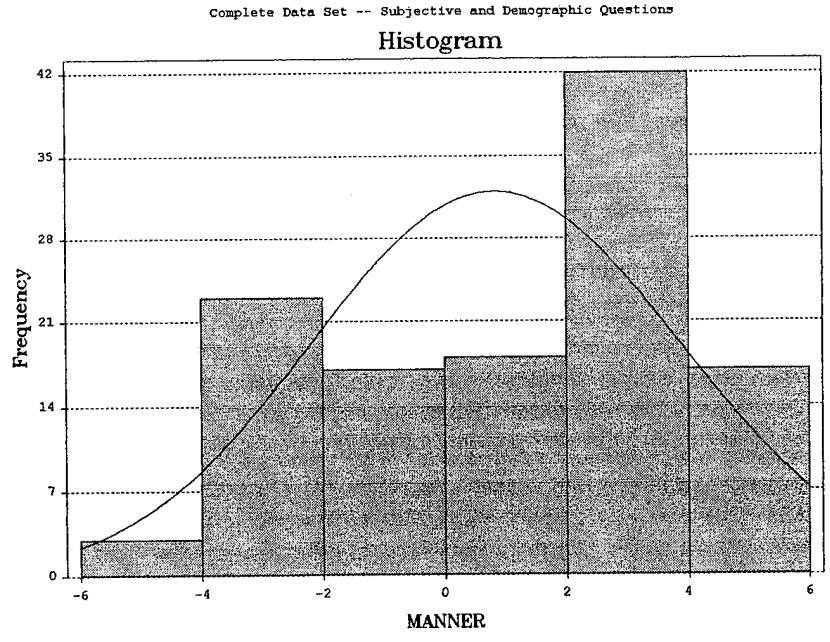

Figure 18. Histogram: MANNER

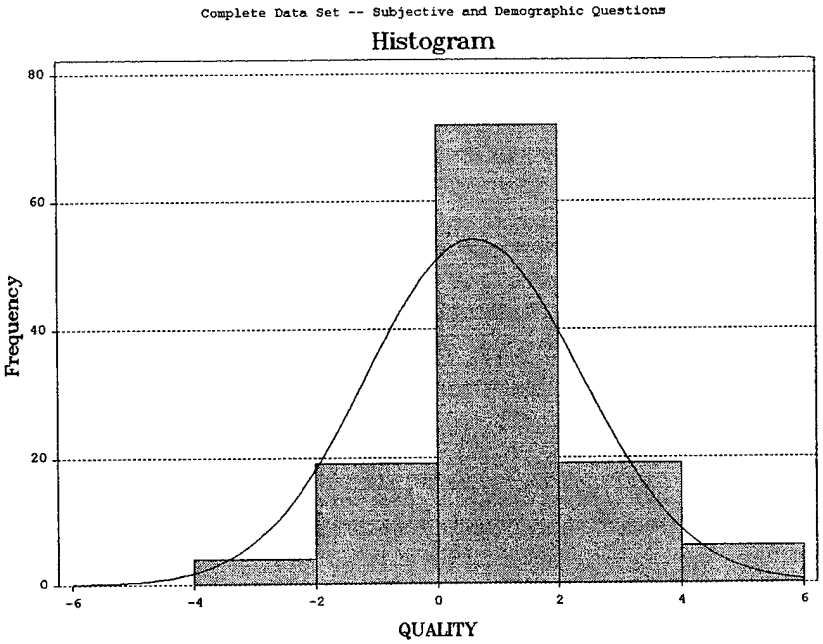

Figure 19. Histogram: QUALITY

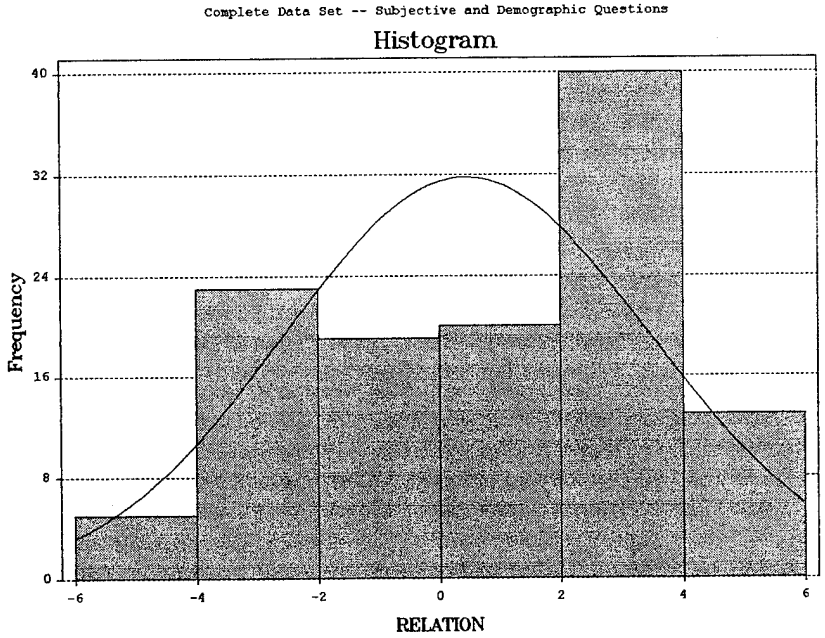

Figure 20. Histogram: RELATION

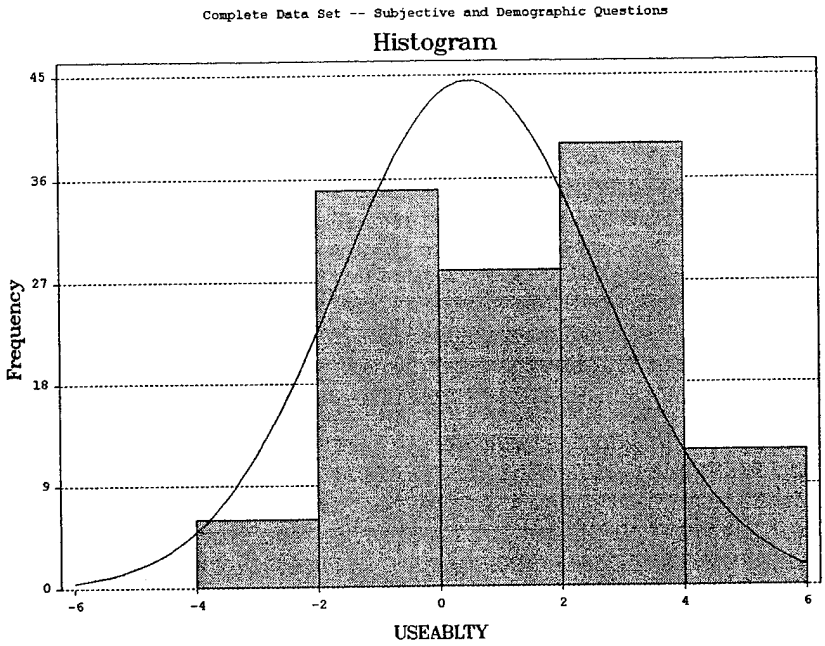

Figure 21. Histogram: USABILITY

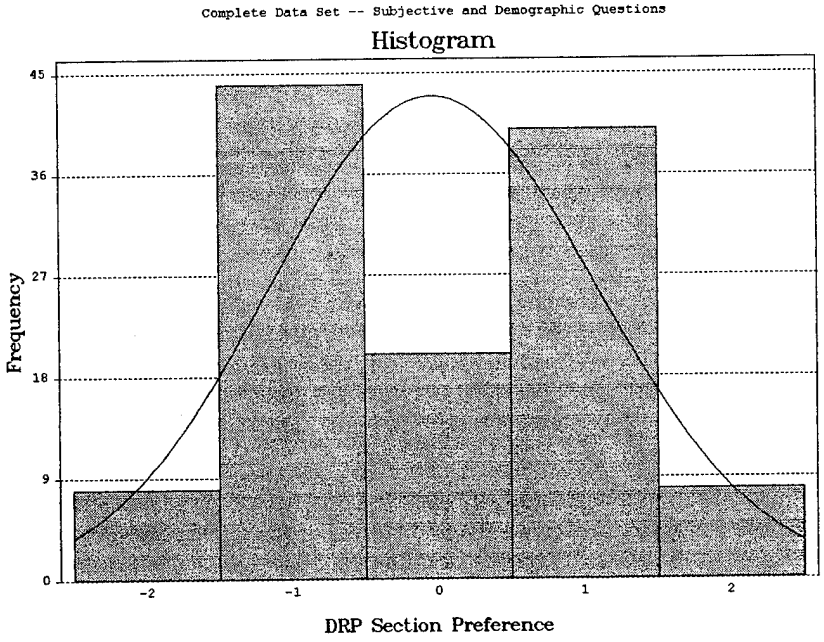

Figure 22. Histogram: Question P65

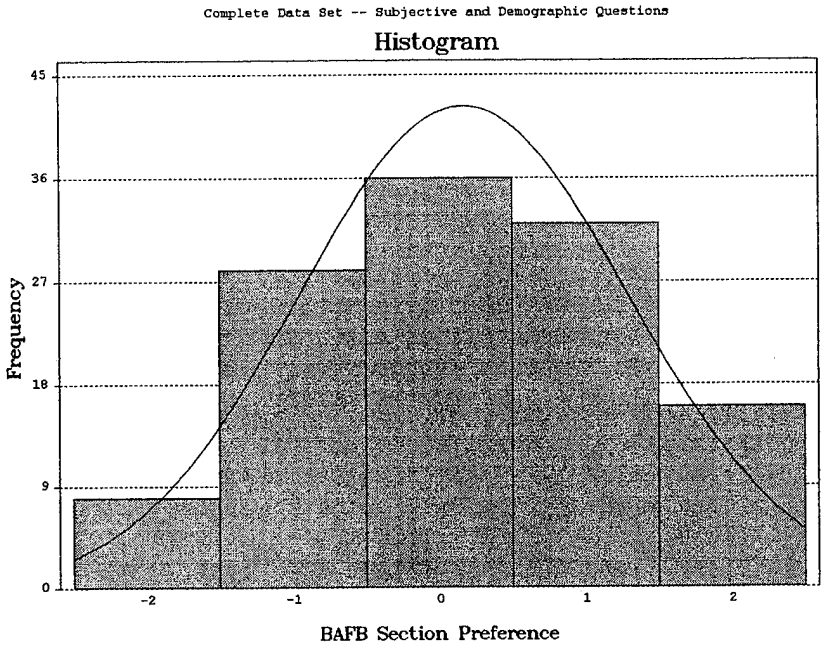

Figure 23. Histogram: Question P66

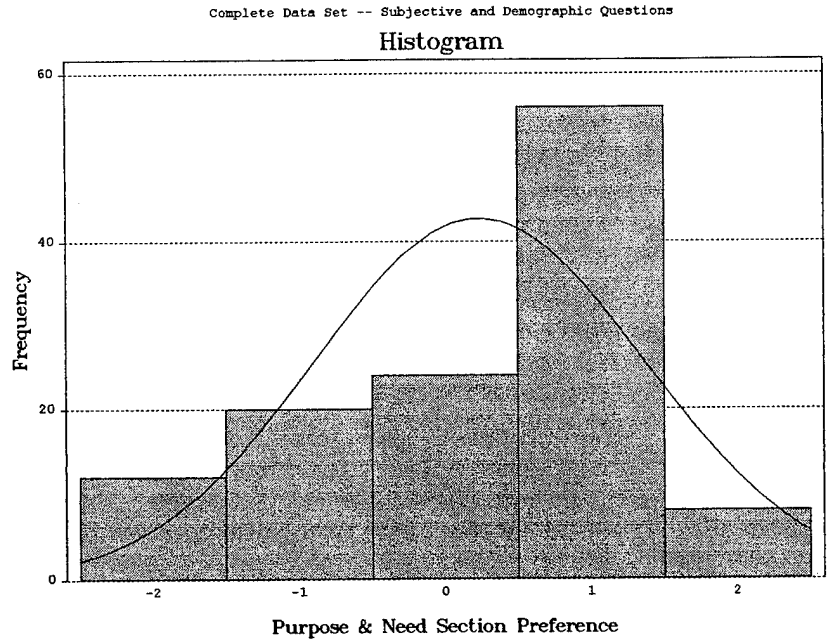

Figure 24. Histogram: Question P67

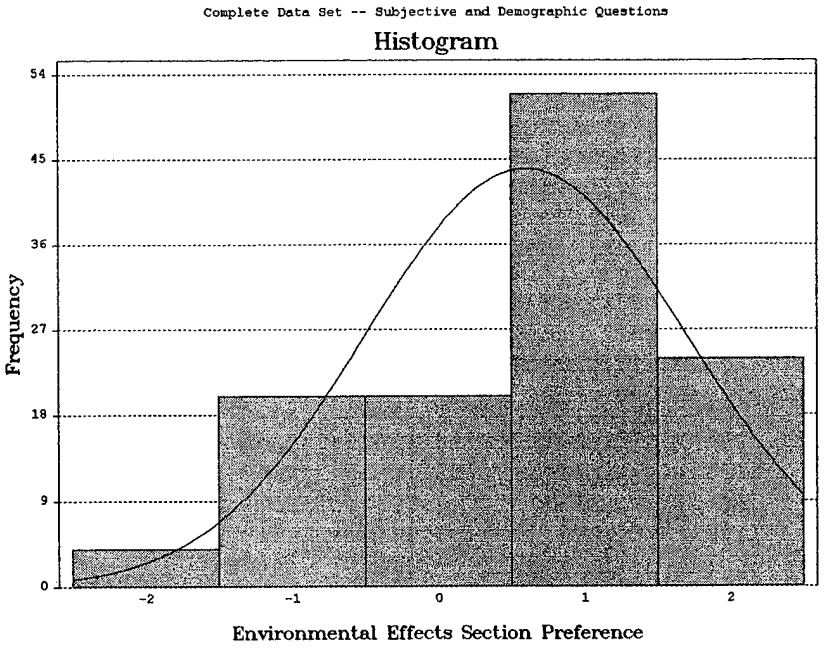

Figure 25. Histogram: Question P68

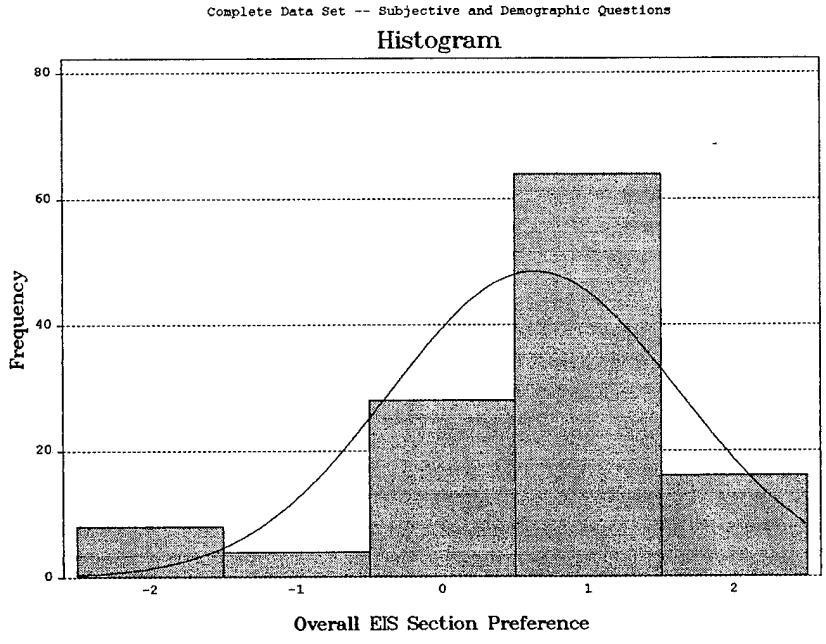

Figure 26. Histogram: Question P69

Box and Whiskers Plots

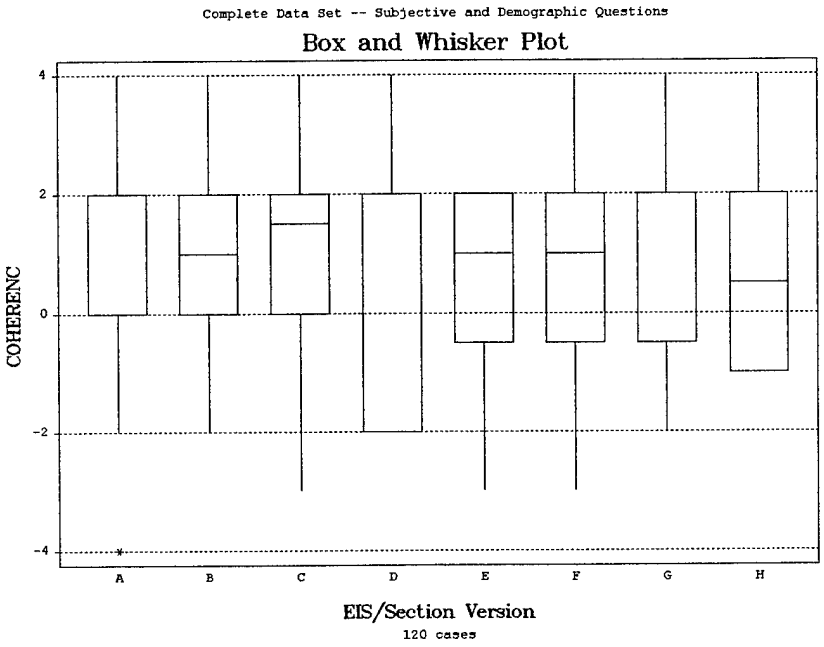

Figure 27. Box and Whiskers Plot: COHERENCE

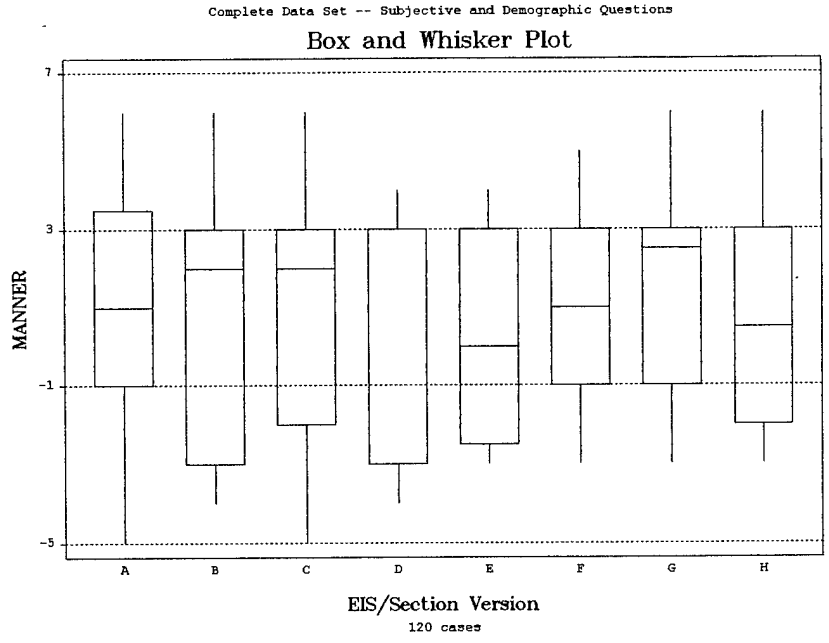

Figure 28. Box and Whiskers Plot: MANNER

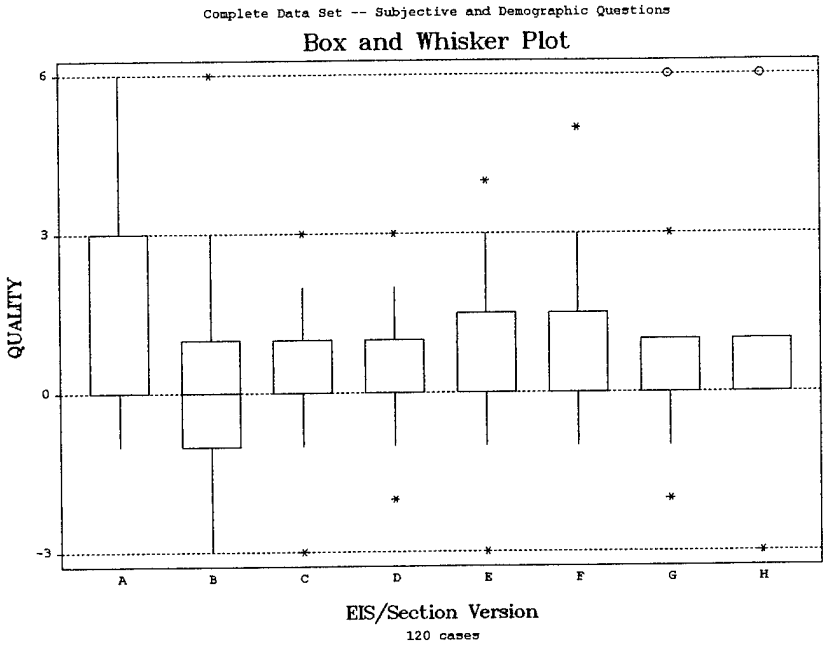

Figure 29. Box and Whiskers Plot: QUALITY

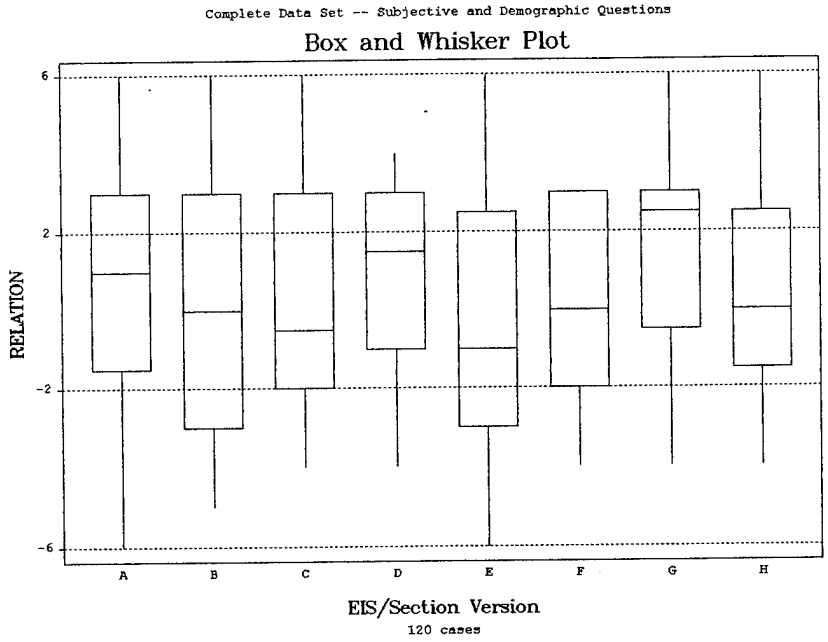

Figure 30. Box and Whiskers Plot: RELATION

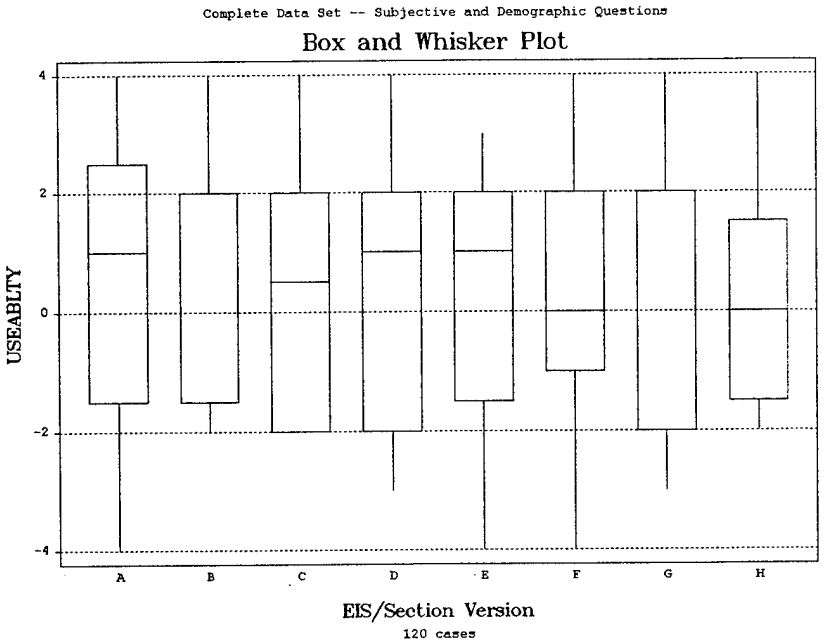

Figure 31. Box and Whiskers Plot: USABILITY

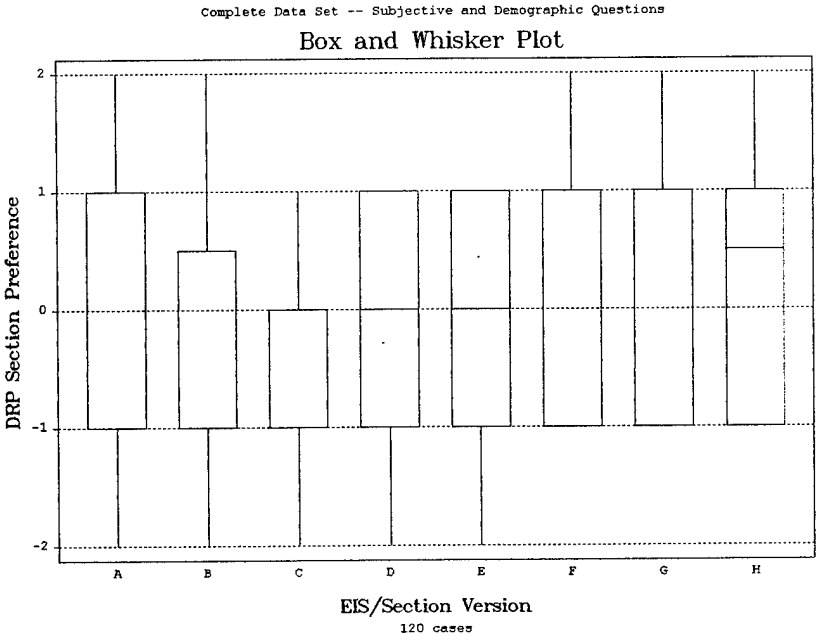

Figure 32. Box and Whiskers Plot: Question P65

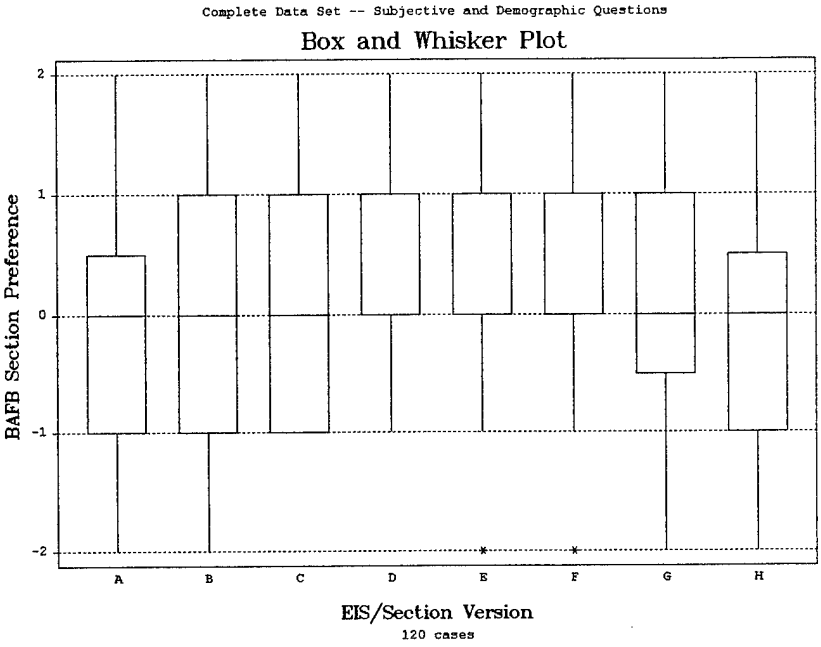

Figure 33. Box and Whiskers Plot: Question P66

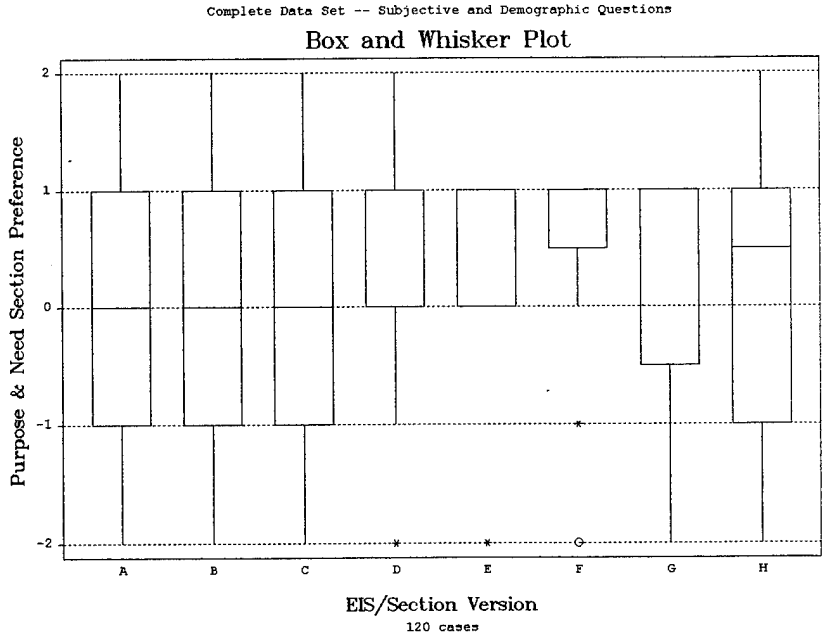

Figure 34. Box and Whiskers Plot: Question P67

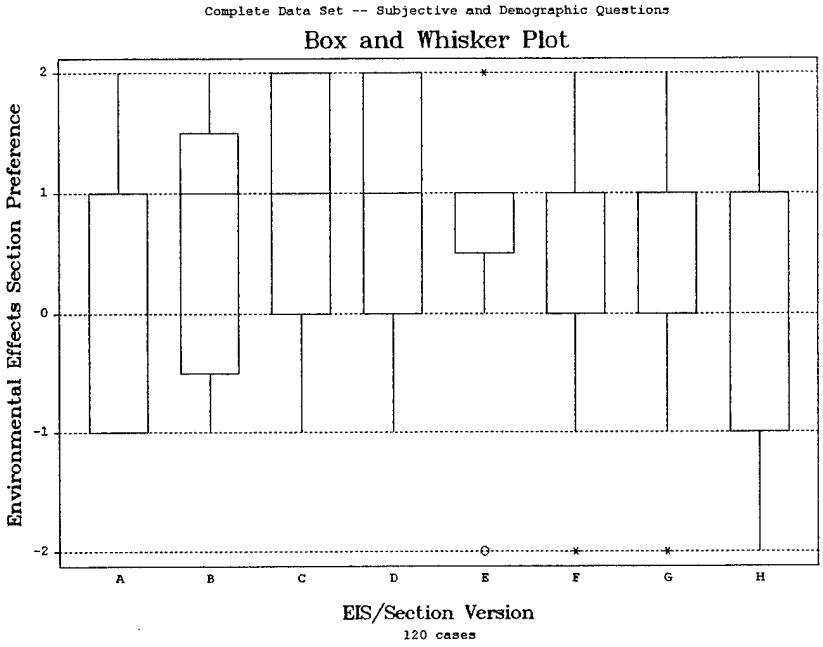

Figure 35. Box and Whiskers Plot: Question P68

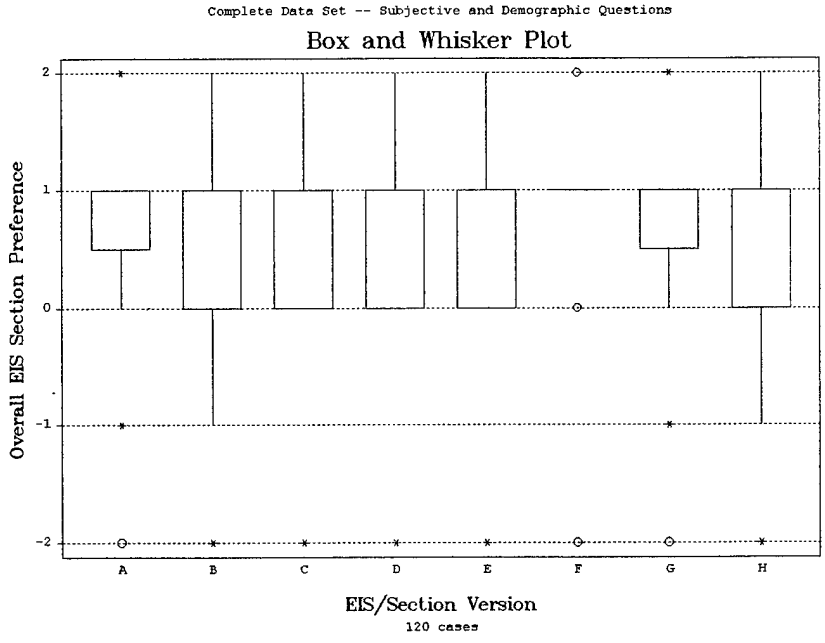

Figure 36. Box and Whiskers Plot: Question P69

Wilk-Shapiro/Rankit Plots

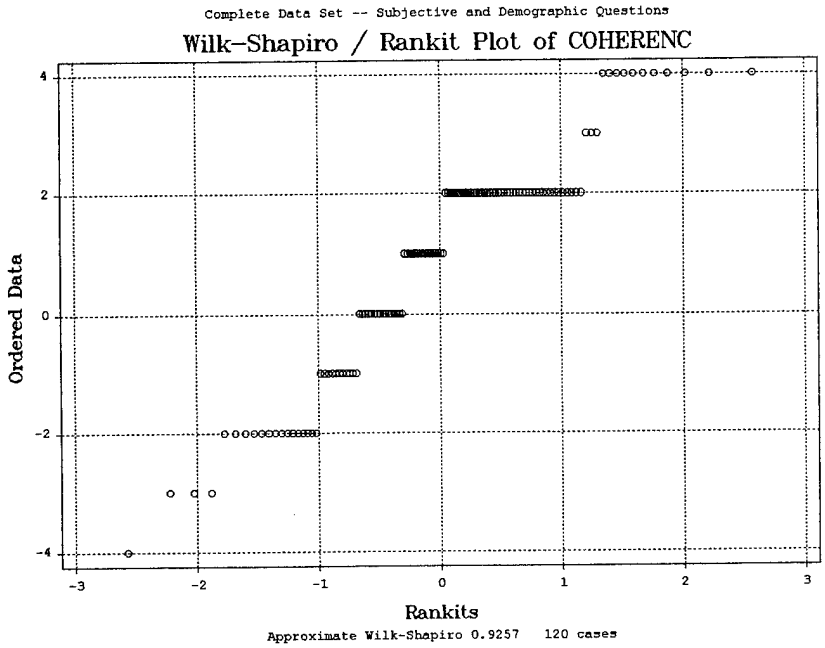

Figure 37. Wilk Shapiro/Rankit Plot: COHERENCE

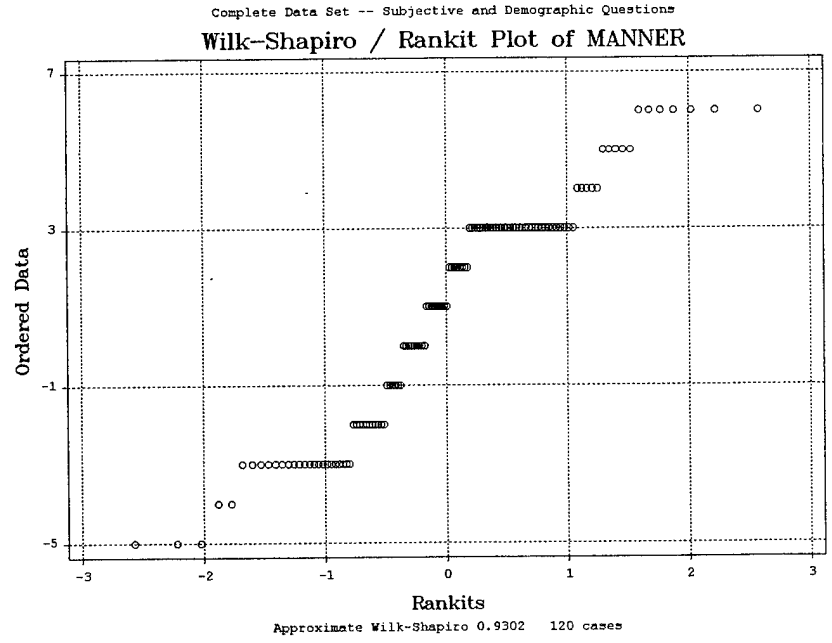

Figure 38. Wilk Shapiro/Rankit Plot: MANNER

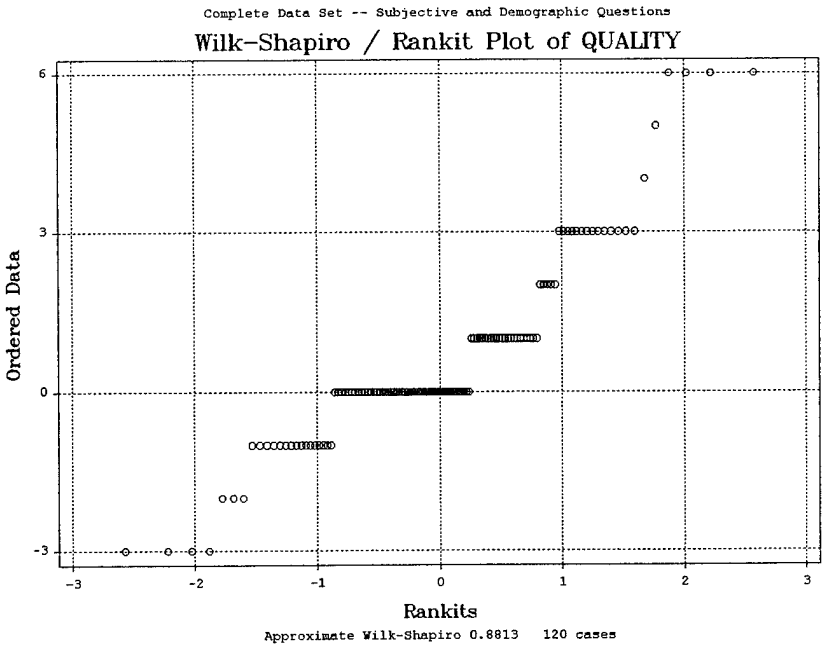

Figure 39. Wilk Shapiro/Rankit Plot: QUALITY

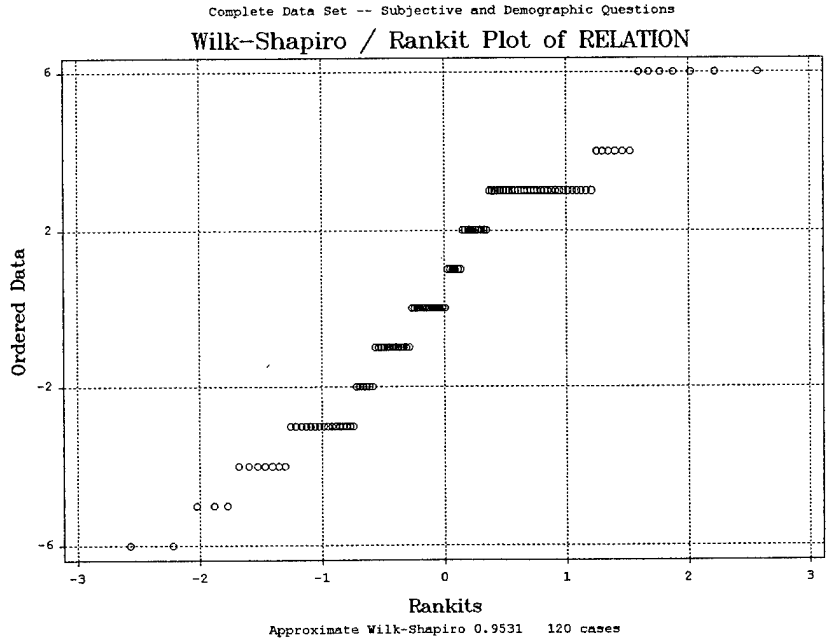

Figure 40. Wilk Shapiro/Rankit Plot: RELATION

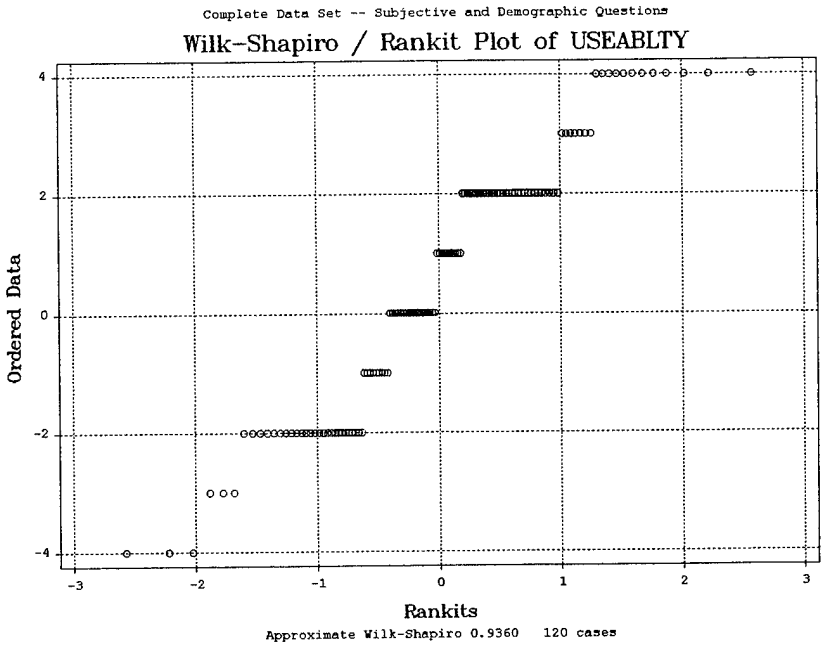

Figure 41. Wilk Shapiro/Rankit Plot: USABILITY

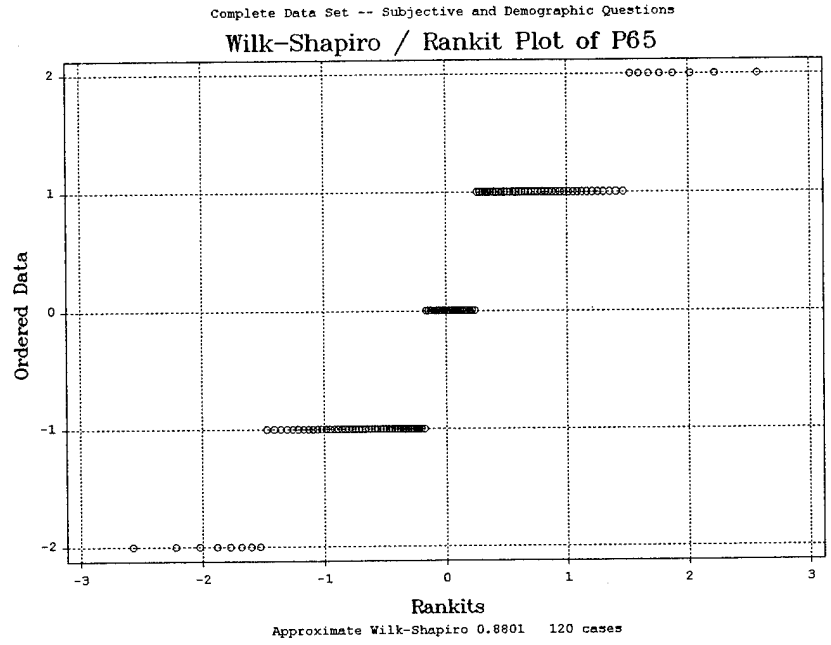

Figure 42. Wilk Shapiro/Rankit Plot: Question P65

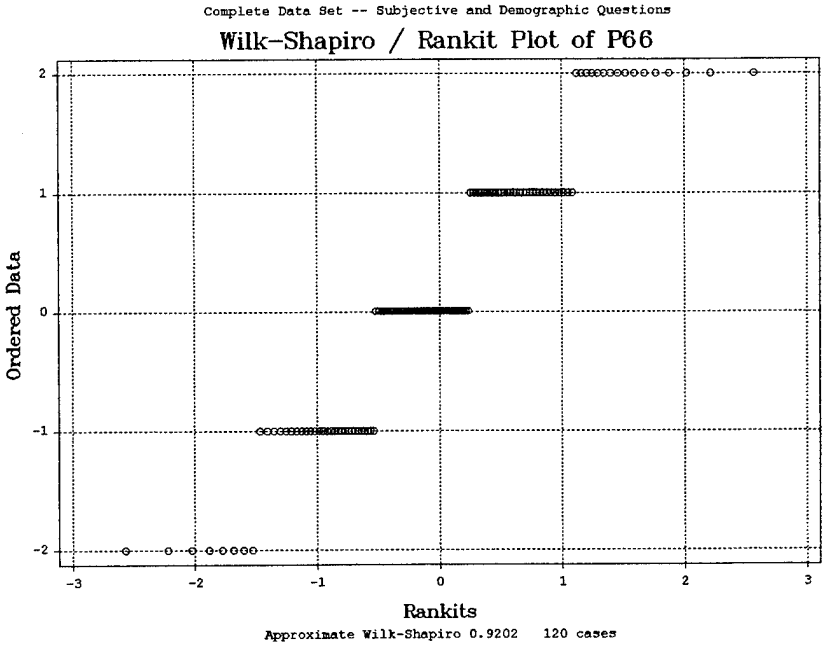

Figure 43. Wilk Shapiro/Rankit Plot: Question P66

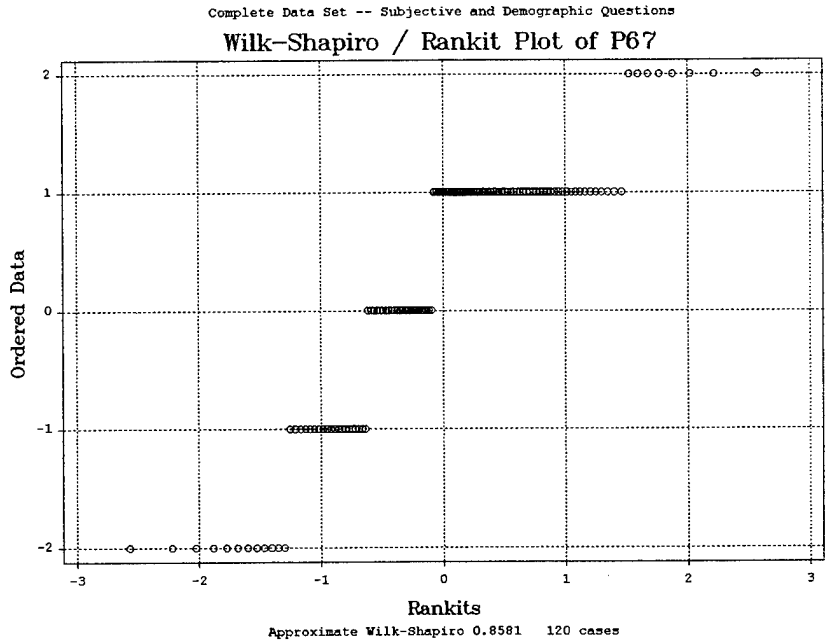

Figure 44. Wilk Shapiro/Rankit Plot: Question P67

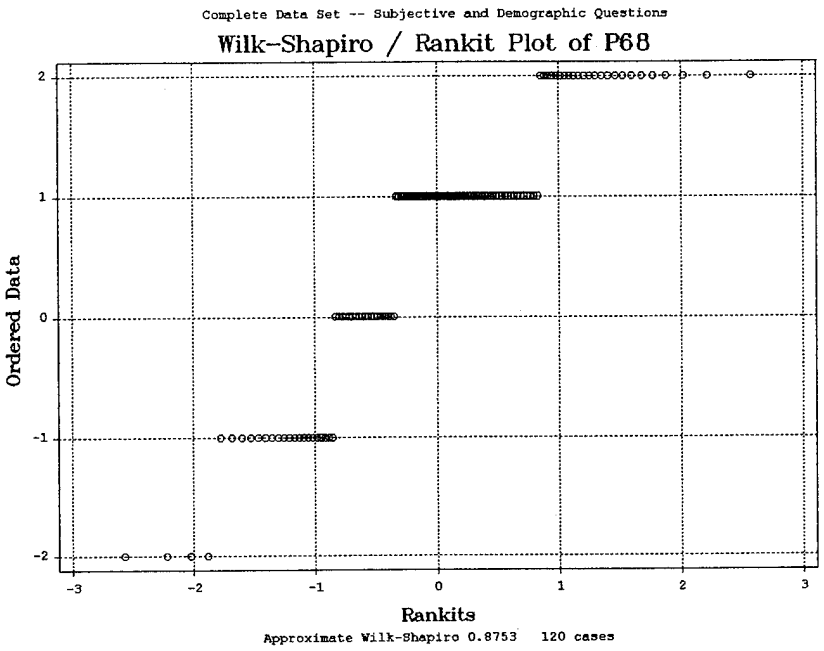

Figure 45. Wilk Shapiro/Rankit Plot: Question P68

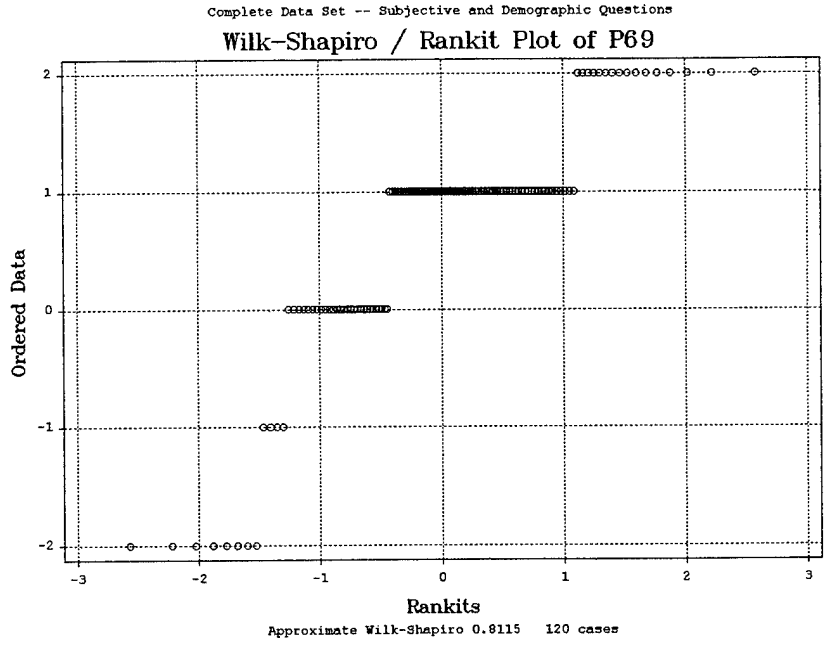

Figure 46. Wilk Shapiro/Rankit Plot: Question P69

ANOVA

ONE-WAY AOV FOR **COHERENC** BY **VER**

SOURCE	DF	SS	MS	F	P
BETWEEN	7	3.92798	0.56114	0.15	0.9925
WITHIN	112	416.664	3.72021		
TOTAL	119	420.592			

	CHI-SQ	DF	P
BARTLETT'S TEST OF EQUAL VARIANCES	1.64	7	0.9772

COCHRAN'S Q 0.1631
LARGEST VAR / SMALLEST VAR 1.6220

COMPONENT OF VARIANCE FOR BETWEEN GROUPS -0.21067
EFFECTIVE CELL SIZE 15.0

VER	MEAN	SAMPLE SIZE	GROUP STD DEV
A	1.0000	15	2.2039
B	1.0000	15	1.8127
C	0.9286	14	1.7305
D	0.8571	14	2.1432
E	0.5333	15	1.7674
F	0.6000	15	1.9198
G	1.0625	16	2.0156
H	0.8750	16	1.7842
TOTAL	0.8583	120	1.9288

CASES INCLUDED 120 MISSING CASES 0

ONE-WAY AOV FOR **USABLTY** BY **VER**

SOURCE	DF	SS	MS	F	P
BETWEEN	7	3.74226	0.53461	0.11	0.9969
WITHIN	112	546.249	4.87723		
TOTAL	119	549.992			

	CHI-SQ	DF	P
BARTLETT'S TEST OF EQUAL VARIANCES	1.54	7	0.9809

COCHRAN'S Q 0.1668
LARGEST VAR / SMALLEST VAR 1.6871

COMPONENT OF VARIANCE FOR BETWEEN GROUPS -0.28960
EFFECTIVE CELL SIZE 15.0

VER	MEAN	SAMPLE SIZE	GROUP STD DEV
A	0.7333	15	2.5486
B	0.7333	15	2.2509
C	0.4286	14	2.0273
D	0.5000	14	2.1031
E	0.2667	15	2.1536
F	0.3333	15	2.1269
G	0.6875	16	2.4144
H	0.3750	16	1.9621
TOTAL	0.5083	120	2.2084

CASES INCLUDED 120 MISSING CASES 0

ONE-WAY AOV FOR **MANNER** BY **VER**

SOURCE	DF	SS	MS	F	P
BETWEEN	7	15.5720	2.22457	0.24	0.9741
WITHIN	112	1051.09	9.38477		
TOTAL	119	1066.67			

	CHI-SQ	DF	P
BARTLETT'S TEST OF EQUAL VARIANCES	1.85	7	0.9679

COCHRAN'S Q 0.1690
LARGEST VAR / SMALLEST VAR 1.7635

COMPONENT OF VARIANCE FOR BETWEEN GROUPS -0.47750
EFFECTIVE CELL SIZE 15.0

VER	MEAN	SAMPLE SIZE	GROUP STD DEV
A	1.0000	15	3.5657
B	1.0667	15	3.3905
C	0.9286	14	3.0500
D	0.5714	14	3.1062
E	0.2667	15	2.8149
F	0.7333	15	2.6851
G	1.5000	16	2.8048
H	0.5625	16	3.0104
TOTAL	0.8333	120	3.0635

CASES INCLUDED 120 MISSING CASES 0

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ONE-WAY AOV FOR **RELATION** BY **VER**

SOURCE	DF	SS	MS	F	P
BETWEEN	7	23.0911	3.29872	0.35	0.9286
WITHIN	112	1056.61	9.43401		
TOTAL	119	1079.70			

	CHI-SQ	DF	P
BARTLETT'S TEST OF EQUAL VARIANCES	3.18	7	0.8675

COCHRAN'S Q 0.1694
LARGEST VAR / SMALLEST VAR 1.8811

COMPONENT OF VARIANCE FOR BETWEEN GROUPS -0.40915
EFFECTIVE CELL SIZE 15.0

VER	MEAN	SAMPLE SIZE	GROUP STD DEV
A	0.6667	15	3.4157
B	0.3333	15	3.5790
C	0.2857	14	3.0742
D	0.6429	14	2.7346
E	-0.4000	15	3.5010
F	0.3333	15	2.6095
G	1.2500	16	2.7689
H	0.4375	16	2.7318
TOTAL	0.4500	120	3.0715

CASES INCLUDED 120 MISSING CASES 0

ONE-WAY AOV FOR **QUALITY** BY **VER**

SOURCE	DF	SS	MS	F	P
BETWEEN	7	7.16786	1.02398	0.31	0.9456
WITHIN	112	365.199	3.26070		
TOTAL	119	372.367			

	CHI-SQ	DF	P
BARTLETT'S TEST OF EQUAL VARIANCES	3.91	7	0.7906

COCHRAN'S Q 0.1814
LARGEST VAR / SMALLEST VAR 2.2727

COMPONENT OF VARIANCE FOR BETWEEN GROUPS -0.14916
EFFECTIVE CELL SIZE 15.0

VER	MEAN	SAMPLE SIZE	GROUP STD DEV
A	1.1333	15	1.9952
B	0.4667	15	2.1668
C	0.2857	14	1.4373
D	0.5000	14	1.4544
E	0.6000	15	1.7238
F	0.8000	15	1.7403
G	0.6875	16	1.9906
H	0.4375	16	1.7500
TOTAL	0.6167	120	1.8057

CASES INCLUDED 120 MISSING CASES 0

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ONE-WAY AOV FOR **P65** BY **VER**

SOURCE	DF	SS	MS	F	P
BETWEEN	7	12.0060	1.71514	1.41	0.2059
WITHIN	112	135.861	1.21304		
TOTAL	119	147.867			

	CHI-SQ	DF	P
BARTLETT'S TEST OF EQUAL VARIANCES	1.87	7	0.9669

COCHRAN'S Q 0.1695
LARGEST VAR / SMALLEST VAR 1.8633

COMPONENT OF VARIANCE FOR BETWEEN GROUPS 0.03348
EFFECTIVE CELL SIZE 15.0

VER	MEAN	SAMPLE SIZE	GROUP STD DEV
A	-0.0667	15	1.2799
B	-0.3333	15	1.1751
C	-0.5714	14	0.9376
D	-0.2857	14	1.0690
E	3.701E-18	15	1.0000
F	0.2667	15	1.0328
G	0.4375	16	1.0935
H	0.1875	16	1.1673
TOTAL	-0.0333	120	1.1014

CASES INCLUDED 120 MISSING CASES 0

ONE-WAY AOV FOR **P66** BY **VER**

SOURCE	DF	SS	MS	F	P
BETWEEN	7	9.53929	1.36276	1.07	0.3900
WITHIN	112	143.127	1.27792		
TOTAL	119	152.667			

	CHI-SQ	DF	P
BARTLETT'S TEST OF EQUAL VARIANCES	0.30	7	0.9999

COCHRAN'S Q 0.1417
LARGEST VAR / SMALLEST VAR 1.2383

COMPONENT OF VARIANCE FOR BETWEEN GROUPS 0.00566
EFFECTIVE CELL SIZE 15.0

VER	MEAN	SAMPLE SIZE	GROUP STD DEV
A	-0.2000	15	1.0823
B	1.665E-17	15	1.1952
C	0.2857	14	1.2044
D	0.5714	14	1.0894
E	0.5333	15	1.1255
F	0.3333	15	1.1127
G	0.0625	16	1.1236
H	-0.1875	16	1.1087
TOTAL	0.1667	120	1.1305

CASES INCLUDED 120 MISSING CASES 0

==========

ONE-WAY AOV FOR **P67** BY **VER**

SOURCE	DF	SS	MS	F	P
BETWEEN	7	4.29345	0.61335	0.47	0.8531
WITHIN	112	145.173	1.29619		
TOTAL	119	149.467			

	CHI-SQ	DF	P
BARTLETT'S TEST OF EQUAL VARIANCES	2.55	7	0.9232

COCHRAN'S Q 0.1571
LARGEST VAR / SMALLEST VAR 1.9545

COMPONENT OF VARIANCE FOR BETWEEN GROUPS -0.04554
EFFECTIVE CELL SIZE 15.0

VER	MEAN	SAMPLE SIZE	GROUP STD DEV
A	0.0667	15	1.2228
B	-0.0667	15	1.2799
C	0.0714	14	1.2688
D	0.2857	14	1.2044
E	0.4000	15	1.0556
F	0.5333	15	0.9155
G	0.3750	16	1.0247
H	0.1875	16	1.1087
TOTAL	0.2333	120	1.1385

CASES INCLUDED 120 MISSING CASES 0

ONE-WAY AOV FOR **P68** BY **VER**

SOURCE	DF	SS	MS	F	P
BETWEEN	7	3.27857	0.46837	0.38	0.9115
WITHIN	112	137.521	1.22787		
TOTAL	119	140.800			

	CHI-SQ	DF	P
BARTLETT'S TEST OF EQUAL VARIANCES	1.29	7	0.9886

COCHRAN'S Q 0.1481
LARGEST VAR / SMALLEST VAR 1.6091

COMPONENT OF VARIANCE FOR BETWEEN GROUPS -0.05065
EFFECTIVE CELL SIZE 15.0

VER	MEAN	SAMPLE SIZE	GROUP STD DEV
A	0.4000	15	1.1832
B	0.6000	15	1.1832
C	0.7143	14	1.1387
D	0.8571	14	0.9493
E	0.8000	15	1.0142
F	0.6000	15	1.0556
G	0.5000	16	1.0954
H	0.3750	16	1.2042
TOTAL	0.6000	120	1.1081

CASES INCLUDED 120 MISSING CASES 0

==========

ONE-WAY AOV FOR **P69** BY **VER**

SOURCE	DF	SS	MS	F	P
BETWEEN	7	0.87143	0.12449	0.12	0.9959
WITHIN	112	114.995	1.02674		
TOTAL	119	115.867			

	CHI-SQ	DF	P
BARTLETT'S TEST OF EQUAL VARIANCES	0.46	7	0.9996

COCHRAN'S Q 0.1422
LARGEST VAR / SMALLEST VAR 1.3213

COMPONENT OF VARIANCE FOR BETWEEN GROUPS -0.06017
EFFECTIVE CELL SIZE 15.0

VER	MEAN	SAMPLE SIZE	GROUP STD DEV
A	0.6667	15	1.0465
B	0.4667	15	1.0601
C	0.6429	14	1.0818
D	0.6429	14	1.0082
E	0.6000	15	0.9856
F	0.8000	15	0.9411
G	0.6250	16	0.9574
H	0.6250	16	1.0247
TOTAL	0.6333	120	1.0133

CASES INCLUDED 120 MISSING CASES 0

Tukey Analyses - Summated Ratings by Construct

TUKEY (HSD) PAIRWISE COMPARISONS OF MEANS OF ***COHERENCE*** BY VERSION

VERSION	MEAN	HOMOGENEOUS GROUPS
G	1.0625	I
B	1.0000	I
A	1.0000	I
C	0.9286	I
H	0.8750	I
D	0.8571	I
F	0.6000	I
E	0.5333	I

TUKEY (HSD) PAIRWISE COMPARISONS OF MEANS OF ***MANNER*** BY VERSION

VERSION	MEAN	HOMOGENEOUS GROUPS
G	1.5000	I
B	1.0667	I
A	1.0000	I
C	0.9286	I
F	0.7333	I
D	0.5714	I
H	0.5625	I
E	0.2667	I

TUKEY (HSD) PAIRWISE COMPARISONS OF MEANS OF ***RELATION*** BY VERSION

VERSION	MEAN	HOMOGENEOUS GROUPS
G	1.2500	I
A	0.6667	I
D	0.6429	I
H	0.4375	I
B	0.3333	I
F	0.3333	I
C	0.2857	I
E	-0.4000	I

TUKEY (HSD) PAIRWISE COMPARISONS OF MEANS OF ***QUALITY*** BY VERSION

VERSION	MEAN	HOMOGENEOUS GROUPS
A	1.1333	I
F	0.8000	I
G	0.6875	I
E	0.6000	I
D	0.5000	I
B	0.4667	I
H	0.4375	I
C	0.2857	I

TUKEY (HSD) PAIRWISE COMPARISONS OF MEANS OF ***USABILITY*** BY VERSION

VERSION	MEAN	HOMOGENEOUS GROUPS
A	0.7333	I
B	0.7333	I
G	0.6875	I
D	0.5000	I
C	0.4286	I
H	0.3750	I
F	0.3333	I
E	0.2667	I

THERE ARE NO SIGNIFICANT PAIRWISE DIFFERENCES AMONG THE MEANS.

CRITICAL Q VALUE 4.367 REJECTION LEVEL 0.050
STANDARD ERRORS AND CRITICAL VALUES OF DIFFERENCES
VARY BETWEEN COMPARISONS BECAUSE OF UNEQUAL SAMPLE SIZES.

Tukey Analyses - Subject Preferences

TUKEY (HSD) PAIRWISE COMPARISONS OF MEANS OF ***QUESTION P65*** BY VERSION

VERSION	MEAN	HOMOGENEOUS GROUPS
G	0.5000	I
E	0.3750	I
D	0.2857	I
F	0.2500	I
H	0.1250	I
C	-0.4286	I
A	-0.7143	I
B	-0.8571	I

TUKEY (HSD) PAIRWISE COMPARISONS OF MEANS OF ***QUESTION P66*** BY VERSION

VERSION	MEAN	HOMOGENEOUS GROUPS
F	0.8571	I
E	0.7143	I
G	0.3750	I
D	0.2857	I
H	-0.1250	I
C	-0.1429	I
A	-0.2500	I
B	-0.2500	I

TUKEY (HSD) PAIRWISE COMPARISONS OF MEANS OF ***QUESTION P67*** BY VERSION

VERSION	MEAN	HOMOGENEOUS GROUPS
F	0.6250	I
E	0.4286	I
D	0.3750	I
H	0.2500	I
C	0.1667	I
G	0.1250	I
B	2.776E-17	I
A	-0.1429	I

TUKEY (HSD) PAIRWISE COMPARISONS OF MEANS OF ***QUESTION P68*** BY VERSION

VERSION	MEAN	HOMOGENEOUS GROUPS
E	0.8750	I
D	0.8333	I
F	0.7143	I
C	0.6250	I
B	0.5714	I
G	0.5000	I
H	0.5000	I
A	0.2500	I

TUKEY (HSD) PAIRWISE COMPARISONS OF MEANS OF ***QUESTION P69*** BY VERSION

VERSION	MEAN	HOMOGENEOUS GROUPS
F	0.8000	I
A	0.6667	I
C	0.6429	I
D	0.6429	I
G	0.6250	I
H	0.6250	I
E	0.6000	I
B	0.4667	I

THERE ARE NO SIGNIFICANT PAIRWISE DIFFERENCES AMONG THE MEANS.

CRITICAL Q VALUE 4.367 REJECTION LEVEL 0.050
STANDARD ERRORS AND CRITICAL VALUES OF DIFFERENCES
VARY BETWEEN COMPARISONS BECAUSE OF UNEQUAL SAMPLE SIZES.

Wilk-Shapiro/Rankit Plots of ANOVA Residuals

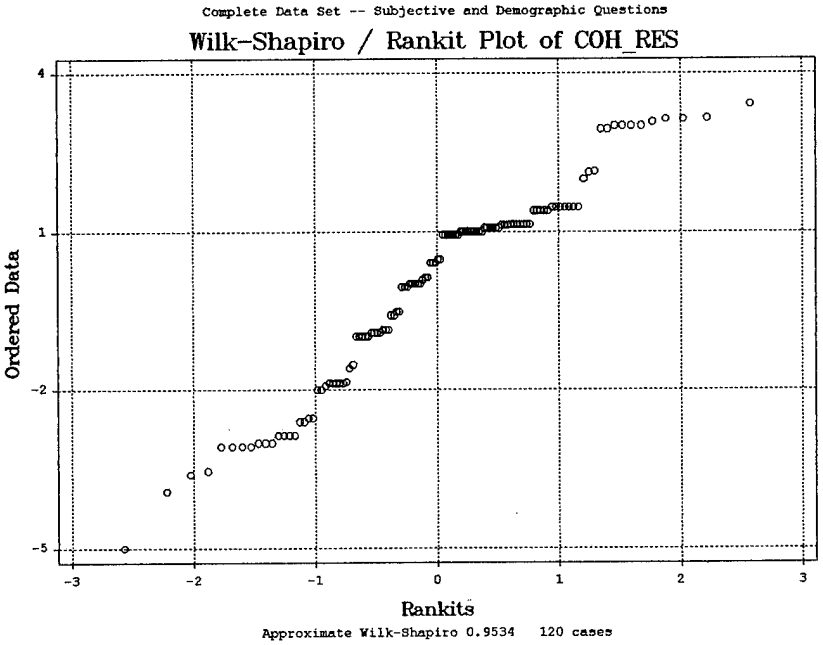

Figure 47. Normality Plot of ANOVA Residuals: COHERENCE

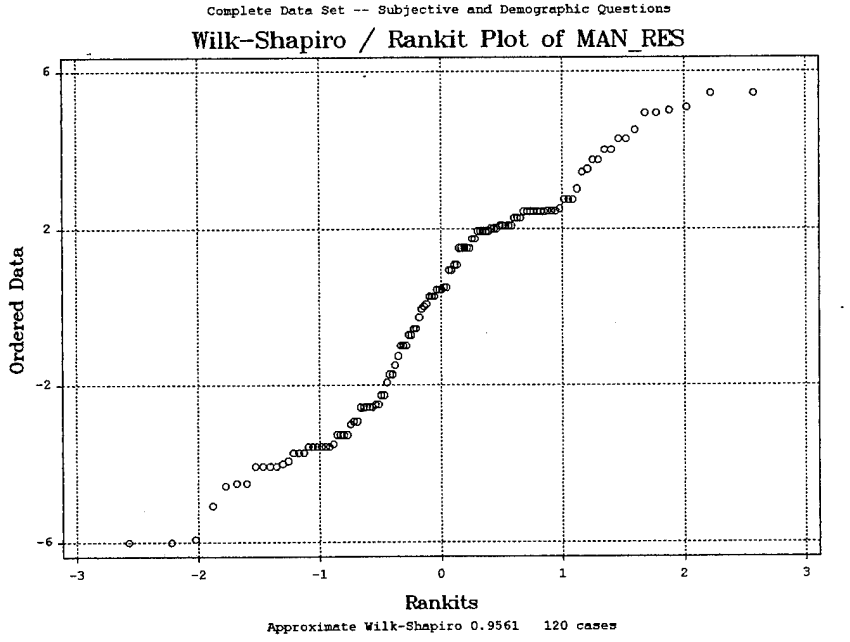

Figure 48. Normality Plot of ANOVA Residuals: MANNER

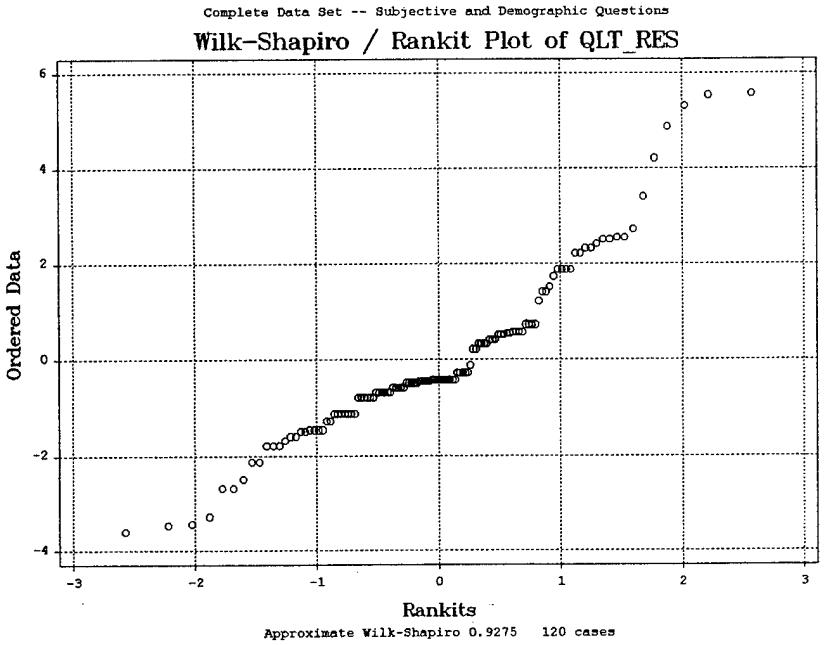

Figure 49. Normality Plot of ANOVA Residuals: QUALITY

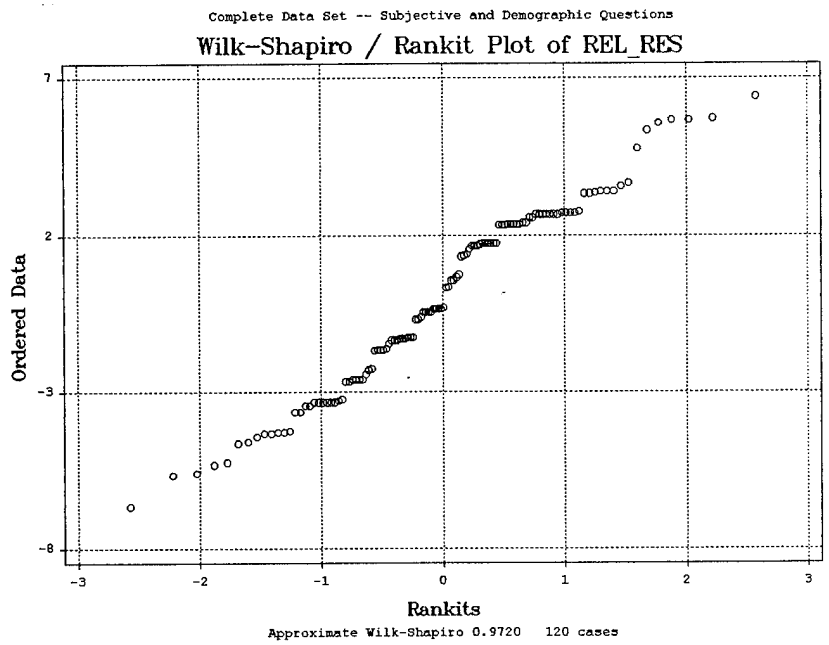

Figure 50. Normality Plot of ANOVA Residuals: RELATION

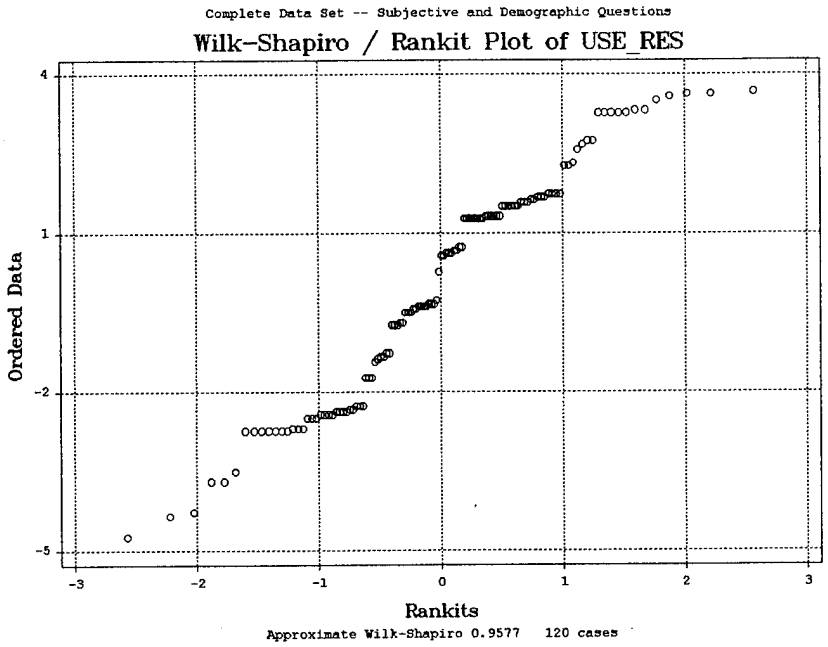

Figure 51. Normality Plot of ANOVA Residuals: USABILITY

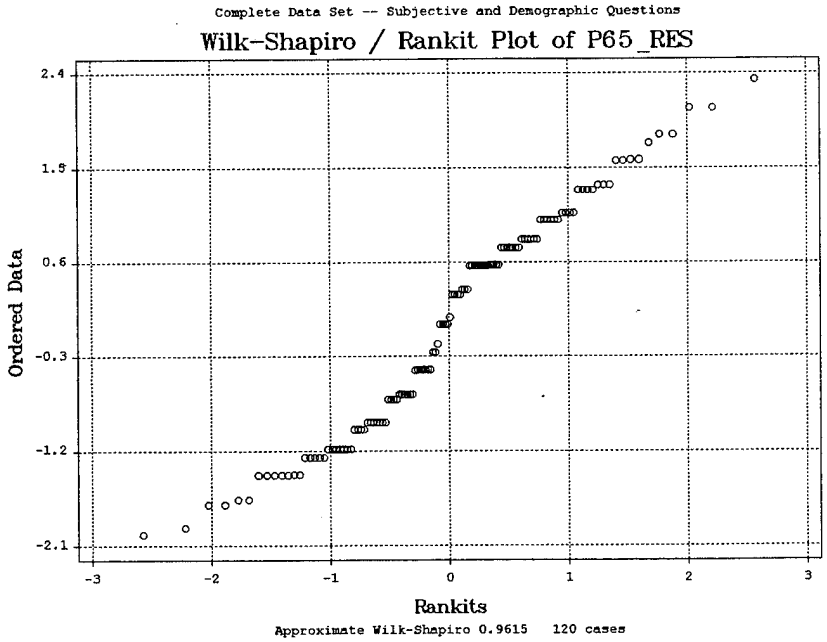

Figure 52. Normality Plot of ANOVA Residuals: Question P65

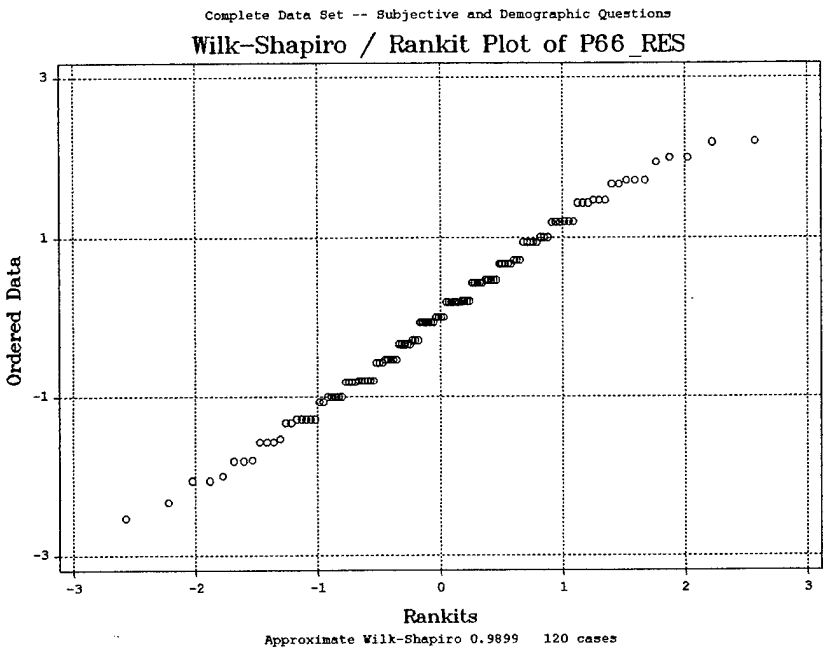

Figure 53. Normality Plot of ANOVA Residuals: Question P66

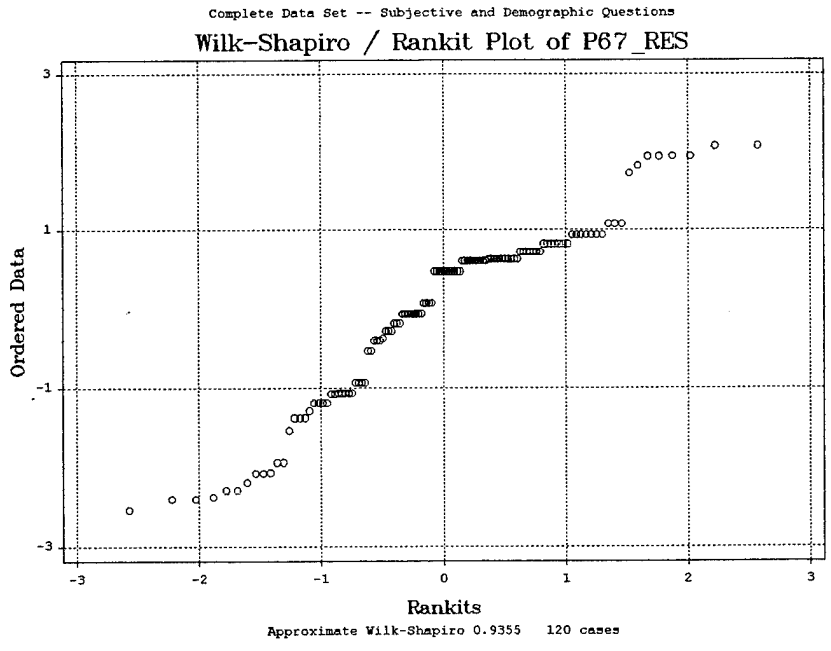

Figure 54. Normality Plot of ANOVA Residuals: Question P67

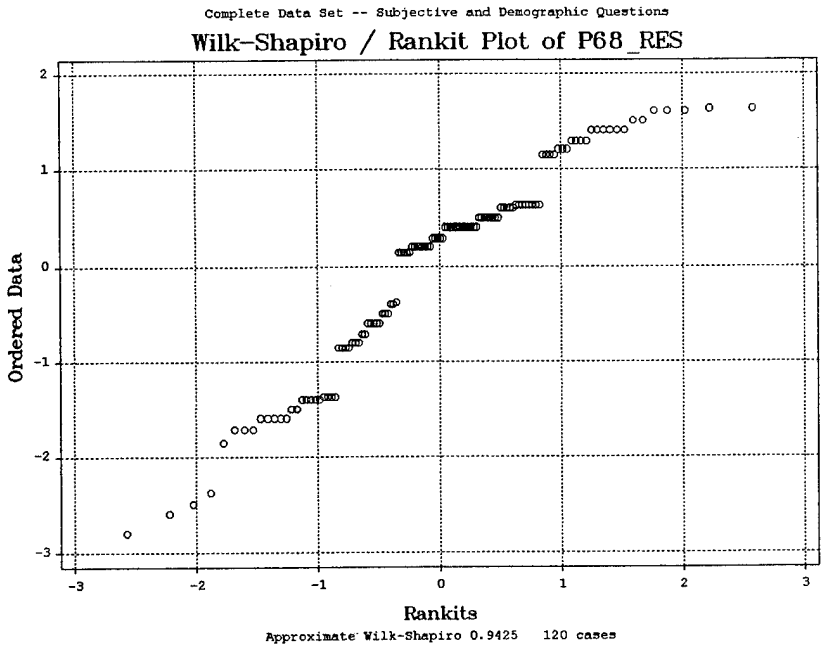

Figure 55. Normality Plot of ANOVA Residuals: Question P68

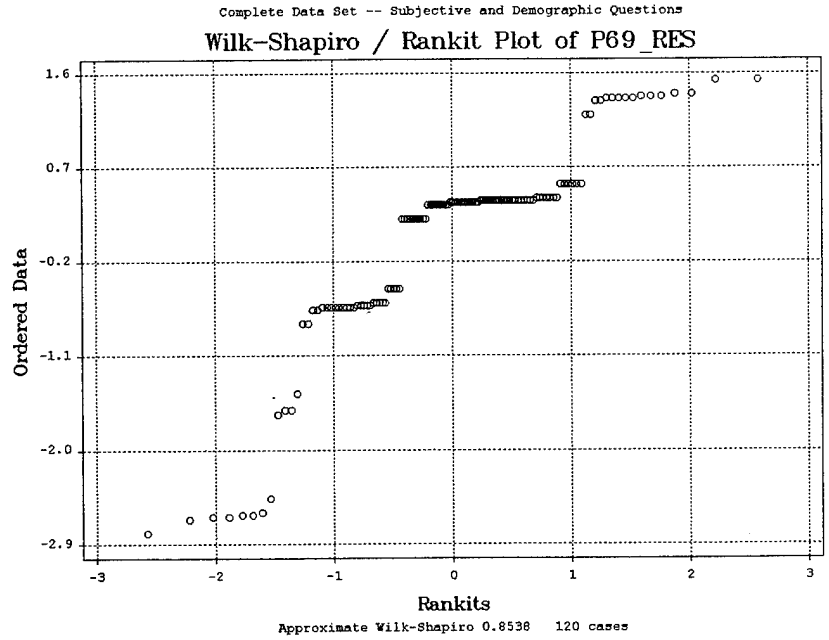

Figure 56. Normality Plot of ANOVA Residuals: Question P69

Spearman Rank Coefficient of Correlation - Raw Data

Complete Data Set -- Subjective and Demographic Questions -- RAW DATA

SPEARMAN RANK CORRELATIONS, CORRECTED FOR TIES

	USE01	COH02	COH03	REL04	USE05	MAN06	QTY07
COH02	0.7170						
COH03	0.5721	0.6907					
REL04	0.5518	0.7316	0.7028				
USE05	0.7540	0.7596	0.6408	0.7424			
MAN06	0.5783	0.6930	0.6035	0.6583	0.7337		
QTY07	0.5317	0.5886	0.4795	0.6484	0.6061	0.5471	
QLT08	0.3625	0.3891	0.2827	0.3197	0.3526	0.3059	0.4422
REL09	0.6034	0.7980	0.5740	0.8112	0.7652	0.7161	0.6321
QTY10	-0.4370	-0.5179	-0.3316	-0.4418	-0.4905	-0.4222	-0.3375
REL11	0.5897	0.7429	0.5186	0.7188	0.7066	0.6872	0.6188
MAN12	0.6280	0.7926	0.6452	0.7740	0.8122	0.7439	0.5986
QTY13	-0.1286	-0.0438	0.0049	-0.0875	-0.2023	-0.0037	-0.2266
QTY13R	0.1286	0.0438	-0.0049	0.0875	0.2023	0.0037	0.2266
QLT14	0.3459	0.4183	0.3143	0.3613	0.3069	0.3486	0.4489
QLT15	0.3449	0.3917	0.2271	0.4218	0.3350	0.4071	0.4554
MAN16	0.6476	0.8442	0.6623	0.7953	0.8554	0.8124	0.6249

	QLT08	REL09	QTY10	REL11	MAN12	QTY13	QTY13R
REL09	0.3684						
QTY10	-0.1720	-0.5135					
REL11	0.3902	0.8483	-0.4324				
MAN12	0.2998	0.7939	-0.4732	0.7669			
QTY13	-0.1963	-0.0770	-0.1016	0.0027	-0.0914		
QTY13R	0.1963	0.0770	0.1016	-0.0027	0.0914	-1.0000	
QLT14	0.7421	0.3546	-0.1551	0.3835	0.2916	-0.2267	0.2267
QLT15	0.5402	0.4340	-0.1619	0.4378	0.3667	-0.2824	0.2824
MAN16	0.3371	0.8629	-0.5351	0.7886	0.8606	-0.0926	0.0926

	QLT14	QLT15
QLT15	0.6445	
MAN16	0.3404	0.3751

MAXIMUM DIFFERENCE ALLOWED BETWEEN TIES 0.00001

CASES INCLUDED 120 MISSING CASES 0

Spearman Rank Coefficient of Correlation - Summated Data by Version

Complete Data Set -- Subjective and Demographic Questions -- SUMMATED DATA

SPEARMAN RANK CORRELATIONS, CORRECTED FOR TIES -- **All Versions**

	COHERENC	USABLTY	MANNER	RELATION
USABLTY	0.8012			
MANNER	0.8391	0.8189		
RELATION	0.8151	0.7663	0.8766	
QUALITY	0.3725	0.3957	0.3991	0.4844

MAXIMUM DIFFERENCE ALLOWED BETWEEN TIES 0.00001
CASES INCLUDED 120 MISSING CASES 0

SPEARMAN RANK CORRELATIONS, CORRECTED FOR TIES -- **Version A**

	COHERENC	USABLTY	MANNER	RELATION
USABLTY	0.9132			
MANNER	0.9522	0.9517		
RELATION	0.9422	0.8900	0.9719	
QUALITY	0.6688	0.6807	0.7317	0.6866

MAXIMUM DIFFERENCE ALLOWED BETWEEN TIES 0.00001
CASES INCLUDED 15 MISSING CASES 0

SPEARMAN RANK CORRELATIONS, CORRECTED FOR TIES -- **Version B**

	COHERENC	USABLTY	MANNER	RELATION
USABLTY	0.8366			
MANNER	0.8996	0.8977		
RELATION	0.8313	0.8050	0.9096	
QUALITY	0.7014	0.7386	0.8456	0.8097

MAXIMUM DIFFERENCE ALLOWED BETWEEN TIES 0.00001
CASES INCLUDED 15 MISSING CASES 0

SPEARMAN RANK CORRELATIONS, CORRECTED FOR TIES -- **Version C**

	COHERENC	USABLTY	MANNER	RELATION
USABLTY	0.5916			
MANNER	0.7037	0.6216		
RELATION	0.8452	0.6678	0.8591	
QUALITY	0.0995	0.0359	-0.0887	-0.0370

MAXIMUM DIFFERENCE ALLOWED BETWEEN TIES 0.00001
CASES INCLUDED 14 MISSING CASES 0

SPEARMAN RANK CORRELATIONS, CORRECTED FOR TIES -- **Version D**

	COHERENC	USABLTY	MANNER	RELATION
USABLTY	0.7768			
MANNER	0.7369	0.7918		
RELATION	0.6259	0.7721	0.9013	
QUALITY	0.1542	0.0678	0.3004	0.4447

MAXIMUM DIFFERENCE ALLOWED BETWEEN TIES 0.00001
CASES INCLUDED 14 MISSING CASES 0

SPEARMAN RANK CORRELATIONS, CORRECTED FOR TIES -- **Version E**

	COHERENC	USABLTY	MANNER	RELATION
USABLTY	0.8743			
MANNER	0.8321	0.7974		
RELATION	0.7980	0.7188	0.8750	
QUALITY	0.1276	-0.0446	-0.0334	0.3401

MAXIMUM DIFFERENCE ALLOWED BETWEEN TIES 0.00001
CASES INCLUDED 15 MISSING CASES 0

SPEARMAN RANK CORRELATIONS, CORRECTED FOR TIES -- **Version F**

	COHERENC	USABLTY	MANNER	RELATION
USABLTY	0.8597			
MANNER	0.6998	0.6609		
RELATION	0.8366	0.7816	0.8272	
QUALITY	0.4103	0.5836	0.2924	0.4496

MAXIMUM DIFFERENCE ALLOWED BETWEEN TIES 0.00001
CASES INCLUDED 15 MISSING CASES 0

SPEARMAN RANK CORRELATIONS, CORRECTED FOR TIES -- **Version G**

	COHERENC	USABLTY	MANNER	RELATION
USABLTY	0.9441			
MANNER	0.9493	0.9051		
RELATION	0.8027	0.7443	0.7759	
QUALITY	0.4856	0.3194	0.4412	0.5981

MAXIMUM DIFFERENCE ALLOWED BETWEEN TIES 0.00001
CASES INCLUDED 16 MISSING CASES 0

SPEARMAN RANK CORRELATIONS, CORRECTED FOR TIES -- **Version H**

	COHERENC	USABLTY	MANNER	RELATION
USABLTY	0.4110			
MANNER	0.7073	0.5433		
RELATION	0.8550	0.5489	0.9285	
QUALITY	0.3622	0.6142	0.5145	0.5160

MAXIMUM DIFFERENCE ALLOWED BETWEEN TIES 0.00001
CASES INCLUDED 16 MISSING CASES 0

Table 14

Summary of Spearman Rank Correlations for Summated Constructs

Construct	EIS Version	*Construct* Coherence	Manner	Quality	Relation	Usability
Coherence	ALL		**0.8391**	0.3752	**0.8151**	**0.8012**
	A		**0.9522**	0.6688	**0.9422**	**0.9132**
	B		-	-	-	-
	C		-	-	-	-
	D		0.7369	0.1542	0.6259	0.7768
	E		**0.8321**	0.1276	**0.7980**	**0.8743**
	F		0.6998	0.4103	**0.8366**	**0.8597**
	G		**0.9493**	0.4856	**0.8027**	**0.9441**
	H		0.7073	0.3622	**0.8550**	0.4110
Manner	ALL	**0.8391**		0.3991	**0.8766**	**0.8189**
	A	**0.9522**		0.7317	**0.9719**	**0.9517**
	B	-		**0.8456**	**0.9096**	**0.8977**
	C	-		-0.0887	**0.8591**	0.6216
	D	0.7369		0.3004	**0.9013**	0.7918
	E	**0.8321**		-0.0334	**0.8750**	**0.7974**
	F	0.6998		0.2924	**0.8272**	0.6609
	G	**0.9493**		0.4412	0.7759	**0.9051**
	H	0.7073		0.5145	**0.9285**	0.5433
Quality	ALL	0.3752	0.3991		0.4844	0.3957
	A	0.6688	0.7317		0.6866	0.6807
	B	-	**0.8456**		**0.8097**	0.7386
	C	-	-0.0887		-0.0370	0.0359
	D	0.1542	0.3004		0.4447	0.0678
	E	0.1276	-0.0334		0.3401	-0.0446
	F	0.4103	0.2924		0.4496	0.5836
	G	0.4856	0.4412		0.5981	0.3194
	H	0.3622	0.5145		0.5160	0.6142
Relation	ALL	**0.8151**	**0.8766**	0.4844		0.7663
	A	**0.9422**	**0.9719**	0.6866		**0.8900**
	B	-	**0.9096**	**0.8097**		**0.8050**
	C	-	**0.8591**	-0.0370		0.6678
	D	0.6259	**0.9013**	0.4447		0.7721
	E	**0.7980**	**0.8750**	0.3401		0.7188
	F	**0.8366**	**0.8272**	0.4496		0.7816
	G	**0.8027**	0.7759	0.5981		0.7443
	H	**0.8550**	**0.9285**	0.5160		0.5489
Usability	ALL	**0.8012**	**0.8189**	0.3957	0.7663	
	A	**0.9132**	**0.9517**	0.6807	**0.8900**	
	B	-	**0.8977**	0.7386	**0.8050**	
	C	-	0.6216	0.0359	0.6678	
	D	0.7768	0.7918	0.0678	0.7721	
	E	**0.8743**	**0.7974**	-0.0446	0.7188	
	F	**0.8597**	0.6609	0.5836	0.7816	
	G	**0.9441**	**0.9051**	0.3194	0.7443	
	H	0.4110	0.5433	0.6142	0.5489	

Spearman Rank Coefficient of Correlation Plots by Construct

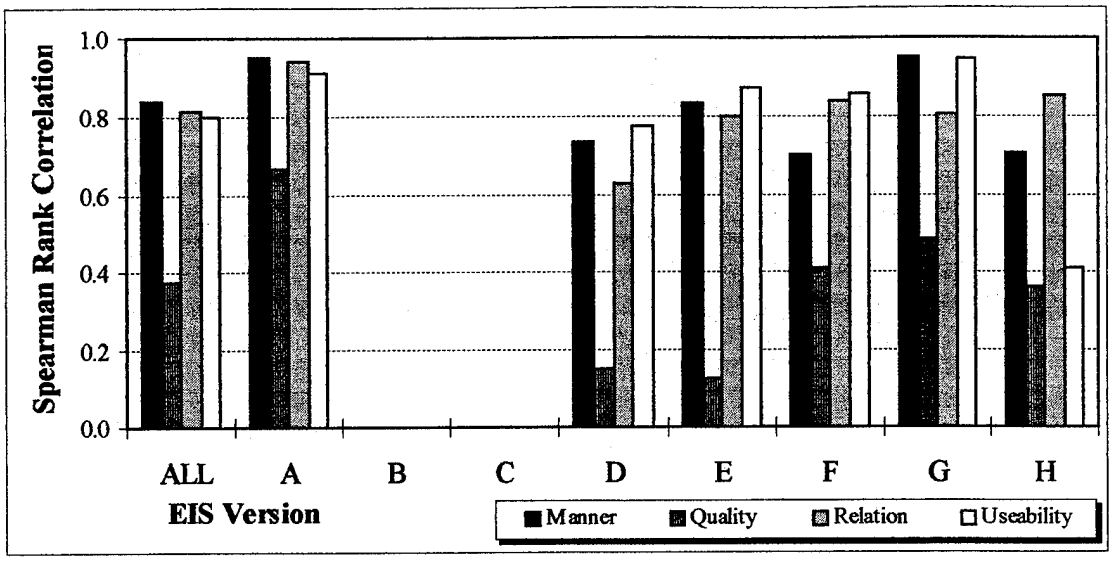

Figure 57. Spearman Rank Correlation for COHERENCE Construct

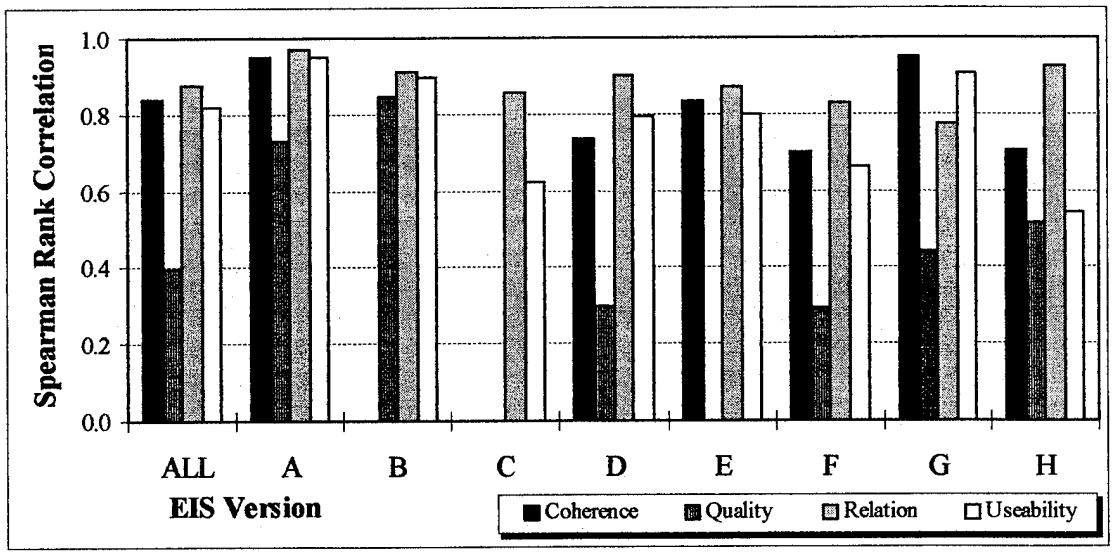

Figure 58. Spearman Rank Correlation for MANNER Construct

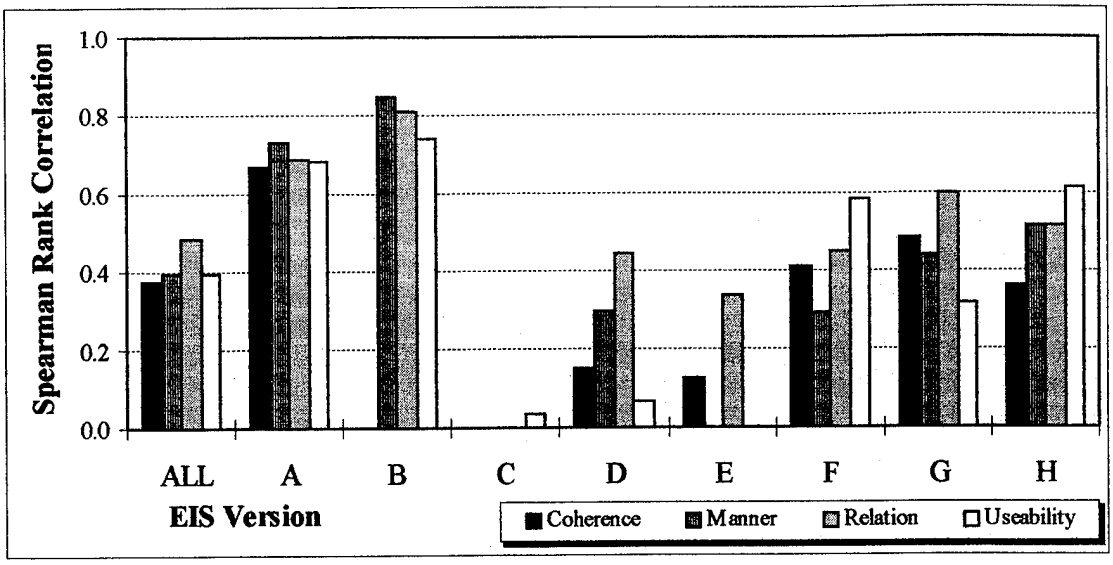

Figure 59. Spearman Rank Correlation for QUALITY Construct

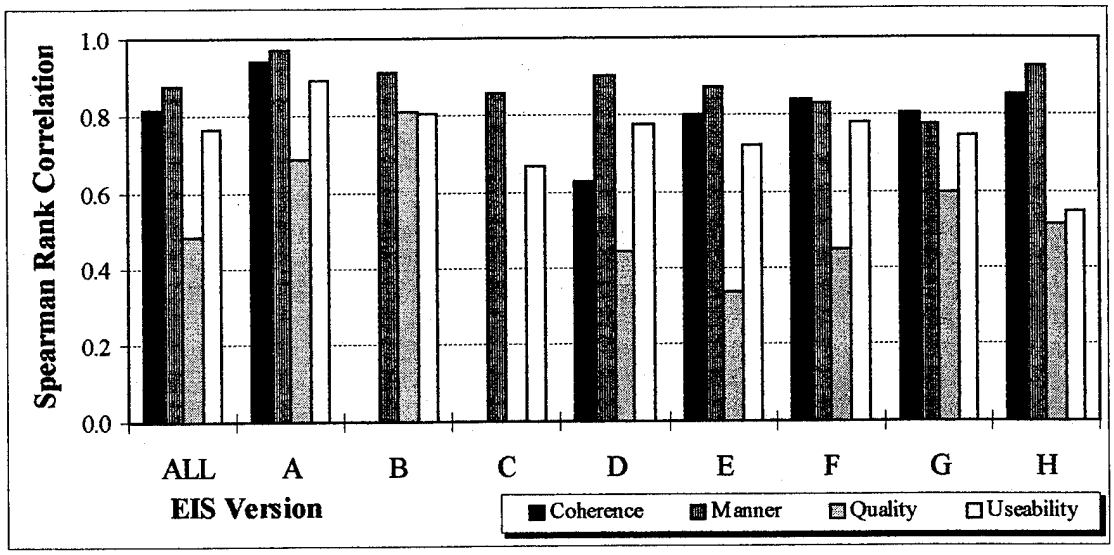

Figure 60. Spearman Rank Correlation for RELATION Construct

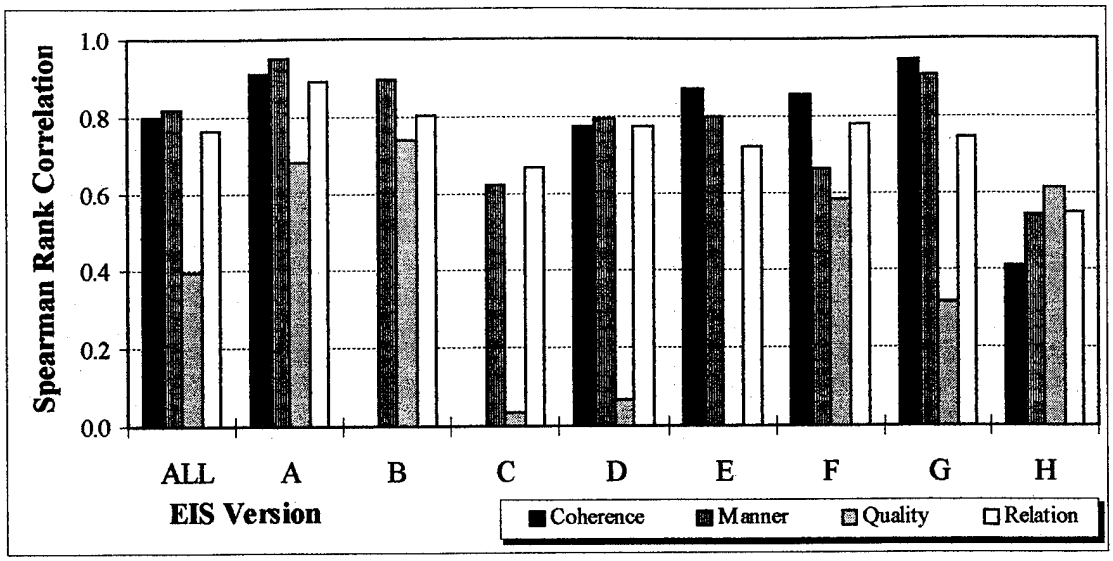

Figure 61. Spearman Rank Correlation for USABILITY Construct

Appendix E: Power of the *F*-Test Calculations

General Description: This appendix illustrates the calculations that were performed in Microsoft Excel to compute the power of the F-Test used in the ANOVA. The procedure is shown below:

> By the power of the F test, we refer to the probability that the decision rule will lead to conclusion H_a when in fact H_a holds. Specifically, the power is given by the following expression:
>
> $$\text{Power} = P\{F^* > F(1 - \alpha, r - 1; n_T - r) | \phi\}$$
>
> where ϕ is the *noncentrality parameter*, that is, a measure of how unequal the μ_i are:
>
> $$\phi = \frac{1}{\sigma}\sqrt{\frac{\sum n_i(\mu_i - \mu_.)^2}{r}} \quad \text{and} \quad \mu_. = \frac{\sum n_i \mu_i}{n_T} \quad \text{(Neter and others, 1990: 634)}$$

In the above equations:

n_i refers to the number of cases in the i^{th} factor level,

n_T refers to the total number of cases in the study,

μ_i refers to the mean value of the ith factor level,

$\mu_.$ refers to the grand mean for the entire study, and

σ refers to the total variance for the study.

Table A-2 in Keppel (1991: 515) was used to obtain the values for power at $\nu_1 = 7$ (degrees of freedom in the numerator of F^*), $\nu_2 = \infty$ (degrees of freedom in the denominator of F*), and $\alpha = 0.05$ (level of significance). The results are shown in Table 13 on page 55 of Appendix E.

Calculations performed in *Microsoft Excel* to obtain the ϕ values in Table 13 are shown in the rest of this appendix.

120 Total sample size (n_T)
8 Number of factor levels (r)
7 F^* numerator degrees of freedom (ν_1)
112 F^* denominator degrees of freedom (ν_2)
0.05 Level of significance (α)

COH	Factor Level	σ_i	n_i	Sample Mean	$n_i\mu_i$	$n_i(\mu_i-\mu_.)^2$		
	A	2.2039	15	1.0000	15.0000	0.3011	$\mu_.$ =	0.8583
	B	1.8127	15	1.0000	15.0000	0.3011	ϕ =	0.3633
	C	1.7305	14	0.9286	13.0004	0.0691		
	D	2.1432	14	0.8571	11.9994	0.0000		
	E	1.7674	15	0.5333	7.9995	1.5846		
	F	1.9198	15	0.6000	9.0000	1.0010		
	G	2.0156	16	1.0625	17.0000	0.6670		
	H	1.7842	16	0.8750	14.0000	0.0044		
		1.9288	120		102.9993	3.9284		
				0.8583				

USE	Factor Level	σ_i	n_i	Sample Mean	$n_i\mu_i$	$n_i(\mu_i-\mu_.)^2$		
	A	2.5486	15	0.7333	10.9995	0.7592	$\mu_.$ =	0.5083
	B	2.2509	15	0.7333	10.9995	0.7592	ϕ =	0.3097
	C	2.0273	14	0.4286	6.0004	0.0890		
	D	2.1031	14	0.5000	7.0000	0.0010		
	E	2.1536	15	0.2667	4.0005	0.8758		
	F	2.1269	15	0.3333	4.9995	0.4595		
	G	2.4144	16	0.6875	11.0000	0.5136		
	H	1.9621	16	0.3750	6.0000	0.2844		
		2.2084	120		60.9994	3.7417		
				0.5083				

MAN	Factor Level	σ_i	n_i	Sample Mean	$n_i\mu_i$	$n_i(\mu_i-\mu_.)^2$		
	A	3.5657	15	1.0000	15.0000	0.4166	$\mu_.$ =	0.8333
	B	3.3905	15	1.0667	16.0005	0.8169	ϕ =	0.4554
	C	3.0500	14	0.9286	13.0004	0.1270		
	D	3.1062	14	0.5714	7.9996	0.9606		
	E	2.8149	15	0.2667	4.0005	4.8162		
	F	2.6851	15	0.7333	10.9995	0.1501		
	G	2.8048	16	1.5000	24.0000	7.1110		
	H	3.0104	16	0.5625	9.0000	1.1736		
		3.0635	120		100.0005	15.5721		
				0.8333				

REL	Factor Level	σ_i	n_i	Sample Mean	$n_i\mu_i$	$n_i(\mu_i-\mu_.)^2$		
	A	3.4157	15	0.6667	10.0005	0.7044	$\mu_.$ =	0.4500
	B	3.5790	15	0.3333	4.9995	0.2043	ϕ =	0.5531
	C	3.0742	14	0.2857	3.9998	0.3779		
	D	2.7346	14	0.6429	9.0006	0.5210		
	E	3.5010	15	(0.4000)	(6.0000)	10.8375		
	F	2.6095	15	0.3333	4.9995	0.2043		
	G	2.7689	16	1.2500	20.0000	10.2400		
	H	2.7318	16	0.4375	7.0000	0.0025		
		3.0715	120		53.9999	23.0918		
				0.4500				

QLT	Factor Level	σ_i	n_i	Sample Mean	$n_i\mu_i$	$n_i(\mu_i-\mu_.)^2$		
	A	1.9952	15	1.1333	16.9995	4.0037	$\mu_.$ =	0.6167
	B	2.1668	15	0.4667	7.0005	0.3373	ϕ =	0.5242
	C	1.4373	14	0.2857	3.9998	1.5335		
	D	1.4544	14	0.5000	7.0000	0.1906		
	E	1.7238	15	0.6000	9.0000	0.0042		
	F	1.7403	15	0.8000	12.0000	0.5042		
	G	1.9906	16	0.6875	11.0000	0.0803		
	H	1.7500	16	0.4375	7.0000	0.5136		
		1.8057	120		73.9998	7.1673		
				0.6167				

P65	Factor Level	σ_i	n_i	Sample Mean	$n_i\mu_i$	$n_i(\mu_i-\mu_.)^2$
	A	1.2799	15	(0.0667)	(1.0005)	0.0167
	B	1.1751	15	(0.3333)	(4.9995)	1.3498
	C	0.9376	14	(0.5714)	(7.9996)	4.0534
	D	1.0690	14	(0.2857)	(3.9998)	0.8917
	E	1.0000	15	-	-	0.0167
	F	1.0328	15	0.2667	4.0005	1.3502
	G	1.0935	16	0.4375	7.0000	3.5468
	H	1.1673	16	0.1875	3.0000	0.7802
		1.1014	120		(3.9989)	12.0055
				(0.0333)		

$\mu_. =$ (0.0333)
$\phi =$ 1.1122

P66	Factor Level	σ_i	n_i	Sample Mean	$n_i\mu_i$	$n_i(\mu_i-\mu_.)^2$
	A	1.0823	15	(0.2000)	(3.0000)	2.0165
	B	1.1952	15	-	-	0.4166
	C	1.2044	14	0.2857	3.9998	0.1984
	D	1.0894	14	0.5714	7.9996	2.2935
	E	1.1255	15	0.5333	7.9995	2.0164
	F	1.1127	15	0.3333	4.9995	0.4166
	G	1.1236	16	0.0625	1.0000	0.1736
	H	1.1087	16	(0.1875)	(3.0000)	2.0068
		1.1305	120		19.9984	9.5384
				0.1667		

$\mu_. =$ 0.1667
$\phi =$ 0.9659

P67	Factor Level	σ_i	n_i	Sample Mean	$n_i\mu_i$	$n_i(\mu_i-\mu_.)^2$
	A	1.2228	15	0.0667	1.0005	0.4165
	B	1.2799	15	(0.0667)	(1.0005)	1.3502
	C	1.2688	14	0.0714	0.9996	0.3671
	D	1.2044	14	0.2857	3.9998	0.0384
	E	1.0556	15	0.4000	6.0000	0.4167
	F	0.9155	15	0.5333	7.9995	1.3498
	G	1.0247	16	0.3750	6.0000	0.3212
	H	1.1087	16	0.1875	3.0000	0.0336
		1.1385	120		27.9989	4.2934
				0.2333		

$\mu_. =$ 0.2333
$\phi =$ 0.6435

P68	Factor Level	σ_i	n_i	Sample Mean	$n_i\mu_i$	$n_i(\mu_i-\mu_.)^2$		
	A	1.1832	15	0.4000	6.0000	0.6000	$\mu_.$ =	0.6000
	B	1.1832	15	0.6000	9.0000	0.0000	ϕ =	0.5777
	C	1.1387	14	0.7143	10.0002	0.1829		
	D	0.9493	14	0.8571	11.9994	0.9254		
	E	1.1042	15	0.8000	12.0000	0.6000		
	F	1.0556	15	0.6000	9.0000	0.0000		
	G	1.0954	16	0.5000	8.0000	0.1600		
	H	1.2042	16	0.3750	6.0000	0.8100		
		1.1081	120		71.9996	3.2783		
				0.6000				

P69	Factor Level	σ_i	n_i	Sample Mean	$n_i\mu_i$	$n_i(\mu_i-\mu_.)^2$		
	A	1.0465	15	0.6667	10.0005	0.0167	$\mu_.$ =	0.6334
	B	1.0601	15	0.4667	7.0005	0.4166	ϕ =	0.3257
	C	1.0818	14	0.6429	9.0006	0.0013		
	D	1.0082	14	0.6429	9.0006	0.0013		
	E	0.9856	15	0.6000	9.0000	0.0167		
	F	0.9411	15	0.8000	12.0000	0.4166		
	G	0.9574	16	0.6250	10.0000	0.0011		
	H	1.0247	16	0.6250	10.0000	0.0011		
		1.0133	120		76.0022	0.8713		
				0.6333				

Vita

First Lieutenant Ronald B. Shankland was born on 14 September 1960 in Geneva, Illinois. During his youth, he lived in Batavia, Illinois; Manteno, Illinois; Fairmont, West Virginia; Marietta, Ohio; and again in Manteno, Illinois. He graduated from Manteno Senior High School in 1978 and immediately enlisted in the Air Force. He served as a site developer and engineering assistant in civil engineering squadrons, RED HORSE, and the Air Force Engineering and Services Center at such installations as Eielson AFB, Alaska; Grand Forks AFB, North Dakota; Little Rock AFB, Arkansas; Osan AB, Republic of South Korea; and Tyndall AFB, Florida. During his enlisted career, he earned an Associate of Applied Science degree in Surveying Technology from the Community College of the Air Force, as well as an Associate of the Arts degree from Gulf Coast Community College, Panama City, Florida.

Lieutenant Shankland was selected for the Airmen's Education and Commissioning Program as a Technical Sergeant in 1989. He received a Bachelor of Science degree in Civil Engineering, Summa Cum Laude, from the University of Missouri-Rolla in May 1992 and he is registered as an Engineer In Training in the State of Missouri. He received his commission on 17 November 1992 upon graduation from Officer Training School. His first assignment was at MacDill AFB, Florida, as an environmental engineering officer. In May 1994 he entered the School of Engineering, Air Force Institute of Technology, Air University. Upon graduation, he will report for duty as an environmental engineering officer in the 52nd Civil Engineering Squadron, Spangdahlem AB, Germany.

Lieutenant Shankland has been married to the former Michelle Rae Johnson of Park Forest, Illinois, since 10 May 1980. They have two children: Tyffini Rae, who is twelve years old, and Jessica Gail, who is nine.

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Environmental impact statements (EISs) are prepared so decision makers can consider the potential environmental impacts of a proposed action. The National Environmental Policy Act mandates that EISs be clear, concise, and to the point so decision makers and the lay public can understand them; however, several authors assert these documents do not meet this requirement. To examine the usability of EISs, a 1994 AFIT GEEM student, Jill A. Easterly, altered visual and linguistic discourse elements in portions of sample EISs and then a pool of readers answered objective questions about passages from these EISs. Easterly measured the effect of presence or absence of cohesive discourse elements on readers' performance. Dependent variables were accuracy (number of correct responses) and efficiency (time to answer the questions). Her results showed no statistical significance between or among the different treatments. She also collected subjective data regarding readers' perceptions of the documents they reviewed. This thesis evaluated Easterly's subjective data to determine if there was a statistically significant difference in readers' perceptions of document usability with respect to consistency of discourse elements. The results of this thesis paralleled those found by Easterly: there was no statistical significance between or among the different treatments.

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